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THE JOURNAL OF LAND & PUBLIC UTILITY ECONOMICS

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THE JOURNAL OF LAND & PUBLIC UTILITY ECONOMICS

Published by the Institute for Economic Research
(Affiliated with Northwestern University)

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of The Journal of Land and Public Utility Economics, published quarterly, at 337 E. Chicago Ave., Chicago, Ill., for April 1, 1933.

State of Illinois, } ss
County of Cook }

Before me, a notary public in and for the State and county aforesaid, personally appeared Helen C. Monchow, who, having been duly sworn according to law, deposes and says that she is the managing editor of the Journal of Land and Public Utility Economics, and that the following is, to the best of her knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

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(Seal.) JEAN GRIEFEN (My commission expires, May 7, 1936.)

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The Wholesale Electric Business in the Depression

By L. G. CANNON

IN view of the part they have played in the development of a mechanized civilization in the United States, which for over three years has been steadily succumbing to an attack of paralysis, the electric light and power utilities, as an industry, appear to have come off remarkably whole and sound thus far. True, these utilities in all their ramifications, particularly in their corporate arrangements, have not entirely withstood the acid test of the depression, but, as they comprise one of the country's basic industries, they have elicited some admiration, engendered some envy and distrust, and withal have apparently justified being termed natural monopolies.

But almost invisible to the eye that judges the electric utilities by a casual glance at their balance sheets and income statements, there is a withered appendage, which, while by no means symptomatic of eventual decadence of the entire industry, is worth diagnosing. The situation merits analysis for no other reason than to provide a study of the utilities' ability to adjust themselves to deflated conditions, "depression psychology," and the difficult task of meeting competitive threats within the limits imposed on publicly regulated enterprises. The field in question is that concerned with the sales of wholesale power and light service. Laying aside doubtful considerations of cause and effect, in so far as the utilities may have become enmeshed in a web of their own weaving through excessive promotion of the mechanization program of industry, the fact remains that the shrinkage in their gross operating revenues and volume of business since the depression has set in has been almost entirely attributable to decreased wholesale power and light sales to industrial consumers. The term "wholesale power and light sales"[1] ordinarily connotes sales to industrial consumers, electric railway sales,

[1] "Wholesale power and light sales" is regarded as a misnomer by utility technicians. The expressions used in the industry to cover this aspect of the business are: (1) large commercial power and light sales; (2) electric railway sales; and (3) municipal sales.

and gate-way sales to municipalities (all strictly competitive forms of business), but in the following description of the wholesale power problem the term will be taken to denote only industrial business.

That the wholesale business of the utilities has fallen off as the wheels of industry have slowed down is not remarkable. It is readily understood by the student of economics that this business is of the derived-demand type which reacts unfailingly to the movements of the industrial business cycle. What has been remarkable thus far in the depression has been the contrast between the behavior of the wholesale business and the domestic business. Apparently defying the trends of the wholesale power business of the utilities, as well as the tendencies of all lines of commercial and industrial activity in the country, the domestic electric business has not only continued to provide the utilities with almost as much revenue as in pre-depression years but has consistently increased in volume throughout the period of declining markets. The domestic or residential market has been a veritable "backlog." To this seeming paradox of their business the electric utilities very largely owe their present relative stability.

The Facts of the Case

In comparative statistics for 1929 and 1932 this paradoxical situation is revealed.[2] Based on the peak of 1929, the wholesale electric business in 1932 has declined 30% in volume of sales and 22.5% in revenue. On the other hand, the domestic business has shown in the same period an increase of 22.4% in sales and an increase of 8.3% in revenue. As a result of the opposing movements of these two classes of business, the percentage of wholesale sales to total sales (in kw. hrs.) has declined from 58.8% in 1929 to 48.8% in 1932, while the percentage of domestic to total sales has increased from 12.98% (1929) to 18.87% (1932). In point of revenues the percentage of wholesale revenues to total operating earnings has fallen in this period from 29.2% to 24%, while the percentage of domestic revenues has advanced from 29.4% in 1929 to 34% in 1932.[3] For the two classes of business the decline in sales has amounted to 20.6%, while the revenues have decreased only 7.07%.

In addition to the recession of the wholesale power business, assignable in the final analysis to the freezing up of public buying power and buyer interest, the electric utilities in the metropolitan areas have had cause to blame the depression for giving fresh impetus to the movement of decentralization of industry.

Falling markets in the large cities, which in normal times were thought to be served best and most cheaply by production facilities located in close proximity to these cities, together with increased taxes and the mounting importance of overhead costs of all kinds relative to total operating costs, have been the major factors produced by the de-

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[2] *Electrical World*, January 7, 1933.

[3] Increased domestic consumption and revenues have been ascribed to various factors: (1) increased use of appliances; (2) people staying at home more; (3) doubling up of families; (4) more use of electric appliances as substitute services, such as washing machines, irons, etc. Probably each of these factors in varying measure is responsible for the increases. Evidence of the influence of the third item is the fact that the number of domestic customers served by the member utilities of the N. E. L. A. declined from 20,149,352 in 1930 to 20,084,582 in 1931. (In the 12-month period ending September 30, 1932 there was a 1.7% decrease in number of domestic customers compared with the corresponding previous 12-month period.) Evidence of a shifting condition in the housing field is found in the fact that the number of people in electrically lighted houses decreased approximately .006% from 1931 to 1932 (see n. 2 above).

pression which have accelerated removal of industrial plants to rural communities. In Chicago alone the market for industrial products has contracted not only because of reduced buying power but because of a decrease in growth of population. This latter condition has been attributed by the Chicago Regional Planning Association to various factors:[4] (1) hundreds of families have left the city to settle on farms; (2) the normal population increase from rural dwellers moving to the city has not been in evidence; (3) immigration has decreased; (4) marriages have been fewer; and (5) birth rates lower.

What has been the loss in industrial customers to the metropolitan central station companies would seem to have been the gain of the utilities in the far flung regions. Where the corporate interests of the metropolitan and rural companies have been close and their generating facilities have been interconnected and used jointly, the loss and gain of these two types of companies have merely equalized. But where the movement of industry has forced a redundancy of capital, some utilities have suffered a net loss, which in turn has been reflected throughout the entire electric utility field in a general impairment of credit standing. Curiously enough, the decentralization of industry would probably never have become at all pronounced if the advances in the art of distributing electricity had not made cheap power readily available in practically every hamlet in the country. In this respect some utilities may have been responsible for their own misfortunes.

Losses in operating revenues through defections and distress in the ranks of industrial customers were not felt by the utilities until well into 1931. In fact, revenues in 1930 actually increased above the level of 1929, as a result, in part, of an increase in the number of industrial consumers and further because of the attempts of industry to remain on a large-scale production basis by the simple expedient of lowering prices to reach and hold ultimate consumers of manufactured goods. When consumer buying of production goods fell to a point where only distress prices for overstocked inventories could attract sales, the utilities awoke to the realization that they had been caught in the chain of circumstances, with the weak link, in their case, the wholesale power business.

Adjustments to Declining Revenues

To the conservatively financed operating utilities the solution to the problem of higher capital turnover ratios resulting from idle plant capacity and little used distribution equipment was to adjust operating ratios by lowering expenses. At first this was easy to accomplish—and the fulfillment was in line with President Hoover's plea to maintain wage scales—by automatic leveling off of customer costs and output costs in proportion to the reduction in number of customers and the decline in kilowatt-hour sales. Later, as these measures failed to keep the operating and capital turnover ratios in line, horizontal reductions in wage and salary scales were resorted to.

In the cases of the holding company groups and those operating companies which were either overexpanded to begin with or whose wholesale business grossly outweighed the retail business in revenues, the solution to the mounting proportion of fixed costs to total operating expenses was neither so simple nor so painless. For them, receivership and bankruptcy proceedings were the only

[4] *Chicago Daily Tribune*, December 26, 1932, p. 1.

ways out. Too late many of the holding companies found that their margin of control of underlying properties depended upon maintaining the level of wholesale business revenues of the late 1920's. Such earnings expressed in common stock dividends, it was found, had been reflected in the capitalization of controlling equities and when these revenues declined beyond a certain point the equities vanished. The seriousness of loss of wholesale power business was acutely realized by operating companies which had large capital investment in hydro-electric equipment. Also the utilities which had heavy investments in marginal areas of population, largely of an agricultural or temporary industrial character, were staggered by having to continue to pay fixed charges on those now useless capital expenditures.

The Struggle to Retain the Wholesale Business

As a further concomitant of the depression and its effect on the wholesale electric business, the utilities were faced with a second problem—namely, a fight to hold the remaining wholesale business. Because of the automatic reaction of wholesale power rates to low load factor usage of electric service, the fact that proportionate shares of utilities' fixed costs are transferred to consumers through the demand charge became completely exposed. This fact, regardless of the economic reasonableness of the utilities' pricing system, had an unfortunate effect on utilities' relations with industrial customers, who began to consider their electric bills as unrelenting a charge as their own fixed obligations of interest, taxes, and depreciation. Electric costs consequently became a larger proportion of industry's costs of production. No satisfactory figures relating to the percentage of electric costs to total production costs of industry have been available[5] since the United States Census of Manufactures of 1927. That report showed that in that year the total cost of all power and fuel (including fuel for heat) was less than 7% of "value added by manufacture" and barely 3% of the total value of products. However, somewhat indicative of the effect of electric costs on industrial production costs and entirely explanatory of industrial consumers' first thoughts of resentment toward the utilities, are statistics showing that the wholesale power costs to consumers have increased from 1.38 cents per kilowatt hour in 1929 to 1.53 cents in 1932.[6]

Manufacturers of isolated plant equipment were quick to attempt to take advantage of the strained relations between the utilities and wholesale power users. Conditional sales contracts adjusted to "pay-as-you-save" terms were offered to industrial concerns for the purchase of private plant equipment at prices reduced from 20% to 25% under those which had obtained in the previous 10 years.[7] Industrial and large commercial enterprises having "heat balance"[8] operating possibilities were flooded with propositions to install steam turbines or engines for cheap by-product power generation under conditions of low labor and fuel costs. Diesel oil engine competitive threats to central station service became particularly intense because of the singular adaptability of that equipment to a large variety of wholesale power applica-

[5] Reports of the United States Department of Commerce give current figures including cost of materials, as well as power and fuel.

[6] See note 2 above.

[7] A. G. Christie, "Future Cost of Power," *Electrical World*, January 9, 1932.

[8] Heat balances, as applied to the isolated power plant problem, represent the steam uses for heating, industrial processes, etc., which may be served by exhaust steam from prime movers and thus avoid waste of steam primarily developed for electric generation.

tions, remotely or not at all concerned with heat balance considerations. The competition was made particularly avid because the concerns controlling the manufacture of isolated plant equipment saw in the opening up of such a market their own economic salvation. For example, the Baldwin Locomotive Company through its control of one of the large oil engine concerns hoped, no doubt, to compensate in this manner for revenue losses sustained when the market for its prime products became frozen. Further intensifying the competitive situation was the entrance of well-trained technical men into the fold of the isolated plant protagonists, indirectly released to such work by the utilities themseleves in their efforts to reduce overhead expense.[9]

Some private generating plants were sold, and no doubt more will displace central station service as the result of this war of competitive forces. But what is important to note is that, although the war was instigated by isolated plant manufacturers, it soon resolved itself into a battle chiefly between industrialists and the electric utilities. Largely by threatening alternative measures, the industrial consumers have sought to force lower power rates regardless of complicating effects on the utilities' business, while the utilities have striven to keep the war in the wholesale power field above the level of mere price cutting.

Methods of the Utilities' Counterattack

The utilities were not trapped into the vulnerable position of underrating the potential strength of the competitive forces fighting for the wholesale power market nor did they merely deprecate the efforts of industrial customers to obtain lower power rates. They readily gave attention to the seriousness of the competitive threats and began to organize their best available talents to perfect the strategy of counterattack. Entire sales departments, which had normally functioned in building up new types of electric loads, were reorganized to undertake the immediate job of preserving the remaining large power and light business.

Comparative Cost Analyses. The counterattack first took the form of answering the challenge of lower power costs with isolated plant generation by submission of comparative analyses of costs to individual wholesale customers. Such cost analyses were strictly accounting reports of heat, light, and power costs under various plans of private plant generation of electricity as opposed to continued purchase of utilities' electric service. The reports on private plant costs themselves took the form of detailing estimates of expense for fuel, labor, maintenance, and fixed charges on investment for generation equipment. The success of this strategy was by no means one hundred per cent in point of numbers of cases analyzed in this manner. The merits of the plan lay in the effective demonstration to industry of the economies of purchased power, and in the exposition to the utilities of the vulnerability of their rates in cases where private plant generation proved cheaper. Power cost analyses also were effective in dispelling some of the feeling against the utilities' demand charges, by pointing out the analogy between such charges and the fixed costs on isolated plant equipment.

Rate Schedule Adjustments. The insistent, though unconcerted, demands for rate reductions inevitably led to a review of the wholesale power rate situation on the part of the utilities. Effective use of off-peak rate schedules, where

[9] Ely C. Hutchinson, "The Competitive Power Situation," *Electrical World*, October 15, 1932.

the curtailed operations of industrial plants conformed to the limitations imposed upon use of electric service during utilities' system-peak hours, forestalled many competitive threats and calmed the feelings of many industrialists. However, the industrialists were as quick as the utilities' leaders to realize that the depression had produced shifting and unstable system peaks upon which it was impractical to base an allocation of demand costs for off-peak use of electric service. Furthermore, the industrialists pointed to the prevalence of generating capacities well in excess of normal reserves to meet present peak requirements, so that there was no longer any apparent justification for charging for or limiting peak-hour usage of service. These arguments, utility operators felt, were answerable only by a complete recasting of all rate schedules, an expensive and, probably temporary, measure. Disregarding idle capacities, since they could be eliminated by write-offs if in sufficient time they were proved to be unjustifiable items of fixed capital, the problem of assessing demand charges for wholesale power and light service, as well as of charging for all classes of service, devolved upon fixing the point for basing peak responsibilities. The rather general conclusion among utility operators was that system-peak periods of pre-depression years would once more obtain when general economic conditions reached a stable point. With this thought in mind, some features of power contracts were liberalized, by such measures as temporarily shortening peak-hour periods for off-peak schedules, but the principle of design of wholesale power rates was left virtually inviolate.

Some reductions in rates, particularly in energy charges, to conform to lower load factor operating conditions of industry were made by the utilities. Points considered by the utilities in lowering the rates were: (1) vulnerability of existing rates to isolated plant competition; and (2) effect of loss of wholesale power revenue on total revenues.

Throughout the battle to retain remaining wholesale business against competitive forces, the utilities were able to benefit in their fight from tight credit conditions. Although isolated plant manufacturers attempted to disguise conditional sales contracts in terms of payments out of savings over costs of central station service, industrial concerns were not slow to realize that to install their own generating equipment necessitated making capital investment. Business practice in the depression called for maintaining a liquid position and avoiding fixed obligations and, although electric demand charges might be onerous, they did not pursue business into the bankruptcy courts. Thus, much power business stayed on the utilities' lines.

Whether the electric utilities have been successful on all fronts can only be gauged by the crude index of number of wholesale power customers served by the utilities throughout the depression. In 1931 the number of customers actually increased 19.3% over the number served in 1930,[10] while in the 12-months' period ending September, 1932 the number of customers decreased only 1% from the number served in the corresponding period ending September, 1931.

Future Trends of Wholesale Power Business

Scattered reports, impossible of integration for the entire electric utility field, indicate that a stabilization point in electricity sales to wholesale power

[10] N. E. L. A., *Statistical Bulletin*, No. 8 and *Supplements*.

and light customers is being approached. For example, in Chicago the low ebb of large power sales was reached in August, 1932, when the decrease in kilowatt-hour sales was 23.3% compared with the corresponding month of the previous year.[11] Since then the comparative decreases have amounted to 18.9% in September; 16.8% in October; and 9.7% in November.

With such weather signs to guide them, various public utility operators have indicated the attitude the power industry will adopt toward the wholesale business in the future. Very largely that attitude is one of "watchful waiting," tending toward a firm resolution to maintain the present business in preparation for receiving the benefits of future revival of industry. "We can only wait for it to come back to us," Alex Dow, President of the Detroit Edison Company, has said.[12] Even so, utility leaders are not particularly sanguine of any revival of industry in the near future nor do they expect that general business will experience another boom for some time to come, so pronounced, in the cases of all leaders of business, is the present feeling that booms beget depressions.

Future increases to utilities' wholesale power business might come from two major sources: (1) present privately supplied electrical loads consisting of approximately 20,000,000 horse power in industrial plants throughout the country, and (2) development of new industries or of new mechanical devices to replace labor. Any increase in business from the first source probably will depend, as heretofore, on competitive price considerations. Whether the wholesale power business will be further developed from the installation of new types of production machinery in industry will depend on more deep rooted considerations than the mere attraction of such business with low electric rates. Invention and perfection of new utilitarian products are the requisites of new industrial enterprises on which the utilities would have to depend for a business outlet in that direction. Two deterring factors would seem to work against any immediate further mechanization programs in existing industries. (1) Technological unemployment would probably follow in the wake of such programs. (2) Installation of new machinery would probably only displace some present machinery types developed within the last 10 years, thus increasing the fixed cost aspect of our economic structure, and, furthermore, the new machinery might only replace older electric devices with no appreciable increase in power demand.

Whether the wholesale power business is revived in the future, either through revival of all industry or through the addition of formerly competitive loads or new type loads, it is hardly likely that such rates as have been reduced, or others that may be reduced, during the depression will be increased at some later time as a means of recapturing lost revenues. This presumption is based, of course, on maintaining the dollar at its present unit value. Some basis for this assertion can be found in the statement of Mr. Dow[13] that, "limiting myself to the nearer future, I can see no tendency

[11] Taken from statistics prepared by Commonwealth Edison Company for 400 large customers, representative of (1) food products, (2) refrigeration, (3) hotels and amusements, (4) other utilities, (5) steel products, (6) laundries, and (7) the following manufacturing types: (a) electric products, (b) rubber products, (c) yeast and malting, (d) paints, oils, and chemicals, (e) garment making, (f) woodworking, (g) leather manufacturing and products, and (h) various miscellaneous manufacturing.

[12] "The Present and Future Trend of Public Utility Rates," *N. E. L. A. Bulletin*, November, 1932.

[13] *Ibid.*

whatever toward higher rates, excepting only in electric railway and motor omnibus fares." The presumption that no higher wholesale power rates will obtain lies largely in the observable attitude of utilities in fighting to confine the entire rate situation within the limits of the rate-base concept of pricing the service.

The utilities have had small comfort from industrialists in their attempts to adhere to this concept, and recently more technical observers of electric utility operating problems have begun to suggest deviations from the previously accepted practices of rate-making and load-building.

One suggested change in the utilities' wholesale rate policies has been to prepare schedules which would provide for higher charges in good times than in periods of depression, on the theory that such adjustments in charges would more nearly conform to production costs of industry throughout the business cycle. Something can be said for such a suggestion in view of what has been learned regarding industry's apparent willingness to pay a premium for high standard electric service in times of good business and its distaste for unyielding load factor rates in times of depression. But in the main the suggestion appears to be only another product of the psychology of the depression and is open to many objections. In the abstract, it appears to represent merely a transfer of guardianship of surplus funds from the various industries to the utilities, which is to say that the proponents of the idea believe the utilities could better act as trustees of these surpluses, disbursing them in the form of rate reductions, than to let the industries build them up in their own treasuries for release in periods of depression to cover any losses of operation. An obvious fallacy of such a plan is that the system of surcharges and discounts in order to average a fair price for service in the final reckoning would have to be predicated on unfailing predictions of the movements of the business cycle—and surely the severity and length of the present depression have disproved any notions that the upper and lower points of the business cycle can be accurately charted in advance of their happening! But the principal objection to the plan is that it would inevitably involve all phases of the electric utility business, tending to destroy the concept of rate-making based on a fixed valuation and a fixed rate of return and to subject the utilities to all the weakening processes of the business cycle. Furthermore, many signs point to the monopolistic growth of basic industries of the country, a trend which would seem to lead toward adoption of a general pricing system patterned after that now in force with the utilities.

A further suggestion, pertinent to utilities' sales policies from a long-time point of view, is concerned with the abandonment of wholesale business in favor of plans of concentrating on building up the so-called retail business, consisting of domestic and small commercial consumers. This suggestion has the merit of conforming to the trend in the wholesale power business in its declining relative importance to the entire electric utilities' business and thus, having the essence of logic, would seem to represent a mere substitution of a voluntary, expeditious measure for the slower and perhaps more costly forces of free economic selectivity. It has already been seen that the depression has considerably reduced the relative importance of wholesale power business to total business. In point of fact, this decline started well in advance of the depression, for figures show that, while sales to

industry accounted for approximately 48% of the total energy in 1912, and 32% of revenue, the sales to industry in 1929 accounted for approximately 58% of the total and only 30% of the total revenue.[14] Obviously, in that period the wholesale business became a less profitable adjunct of utilities' business, as a result no doubt of lowering rates leveled off by the forces of competition.

This is the situation which the proponents of abandonment of wholesale business have in mind when they recommend concentrated exploitation of the retail business, which in the period 1912 to 1929 increased in sales from 8% of total energy output to 15% of output and in revenue from 26% to approximately ⅓ of the total. To let the wholesale business go to isolated plant competition by gradual default would be a fairly simple matter. But complications would immediately set in to frustrate the practical working of the plan. A serious threat to the entire utilities' business would be presented by permitting isolated plant manufacturers to capture such a huge market. The death thrust to the remaining utilities' field of business operation might well follow, particularly in the metropolitan areas where owners and operators of the large multi-family dwellings, having large power and light demands, would be encouraged to follow the example of the industrial concerns in providing their own power and light facilities.

Furthermore, loss of the wholesale business would introduce a high obsolescence cost factor into the utilities' operating expenses because of forced write-offs of equipment adaptable only to industrial power uses. But, above all, the plan would require immediate expansion of the retail business to load up plant and transmission equipment and it is extremely doubtful that the transfer of use of this equipment to the domestic and commercial customers could be made coincident. The building up of this load would require not only effective merchandise sales' campaigns but scientific planning for the education of consumers in the use of appliances at high load factors and with high diversity factors to produce system conditions comparable to those that obtained under requirements of serving the wholesale business. Otherwise the plan would ultimately result in the establishment of an entirely different basis for charging for service, with some rather pointed implications of higher domestic rates. With the nation's income reduced to about half of that of 1929, with buyer resistance stiffening against high-first-cost merchandise, and with the competition for the maximum share of the consumer's dollar more intense than ever, it is hardly likely that the campaigns to place more electric devices in the home would succeed in the proportions necessary to guarantee the success of the plan.

In the final analysis the main difference between the present policies of utility operators and the suggested programs of others with respect to dealing with the wholesale power business in the future lies in the fact that the former group continues to adhere to the notion that this class of business can only be expected to react to the unstable factors of competition and the business cycle, while the latter group takes the position that past experience should point the way to a cure-or-kill policy. The uncertainties of life and of doing business in a competitive field would not seem to justify any revolutionary rate or sales policies.

[14] C. E. Greenwood, *N. E. L. A. Bulletin*, January, 1931.

A Method for the Classification of Rural Lands for Assessment in Western North Dakota

By CHARLES E. KELLOGG

THE general problems relating to land utilization and land classification are now receiving considerable attention. For several years the soil survey and other more comprehensive surveys have been used for such purposes. This work has been of great assistance in attacking the problems of land utilization,[1] but, to a considerable extent, the actual method of making a land classification in such a way that it can be used directly as a basis for the assessment of taxes has not been worked out. Recent studies, such as those of Hammar in Missouri,[2] show quite clearly and definitely the need for making assessments on the basis of the soil and other physical features by some uniform method.

General Requirements for a Land Classification in North Dakota

Farming land is usually bought and sold in units of 40 acres, quarter-sections, or sections, and taxes are generally levied on each 40-acre tract. Each farm is a unit by itself and its problems of management are small-unit problems. Therefore, if the soil survey is to be an aid in the development of land utilization policies and in the classification of lands for the purpose of assessment and equalization of taxes, it is necessary that the survey be sufficiently detailed to show the differences between these operating units. A generalized map has little value; in fact, it is quite misleading when used for the appraisal of land values or for determining the best utilization of any particular farm or tract of land.

Rural land values and taxes on such land should be based upon the producing power of that land. In order to determine the appraisal of any particular tract of land having certain physical characteristics, such as soils, topography, and so on, the use to which this land is best adapted must be ascertained. A tract of land best suited for general farming should not be evaluated upon the basis of its grazing capacity; and land best suited for timber growing should not be evaluated on its potential crop production. After establishing the use-group, the relative value of the various tracts within the use-group can be ascertained.

A determination of the use to which a piece of land is best fitted depends upon its physical characteristics and environment and the varied experiences of people using land of similar characteristics. This body of experience is not large in recently settled areas. As an agricultural area grows older, as economic conditions change, and as new agricultural techniques are introduced, the best use of the land changes. For this reason a permanent, all-time classification of land is impossible. This is particularly important to bear in mind in considering newly developed areas.

[1] *Proceedings* of the National Conference on Land Utilization, held in Chicago, 1931. In this report L. R. Schoenmann and others have pointed out that the soil survey forms the basis for the work.

See also Schoenmann, L. R., "Land Inventory for Rural Planning in Alger County, Michigan", 16 *Papers and Proceedings Michigan Academy of Science, Arts, and Letters* 329 (1931).

[2] Hammar, Conrad, H., "The Accuracy and Flexibility of the Rural Real Estate Assessment in Missouri", *Missouri Agricultural Experiment Station Research Bulletin*, No. 169 (1932).

The nature of the soil, the topography, and other physical features of the land are essentially permanent. From a knowledge of these conditions, together with present-day results of experience, the land classification can be made. If future changes make this classification inappropriate, it will be a comparatively simple matter to reclassify the land without the need for additional field mapping. Once the physical factors of the land are accurately mapped in detail, the land classification can be revised from time to time at comparatively small cost. But, if the land classification is made in the field on the basis of present economic conditions and present land use, revision of the classification will require that all the field work be done over again. It is, therefore, of the utmost importance to keep the permanent physical data sharply separate from transitory economic conditions.

It is necessary to include all the "mappable" physical characteristics of the land in the survey which is to be used as a basis for the land classification. These include much more than the soil survey itself, although the soil map forms the cornerstone for the work. Some writers have mentioned a long list of factors which must be "taken into consideration." Some of these are not mappable, from any practical point of view. Take, for example, "soil productivity"; the only way to determine this factor would be by a system of controlled test plots on each piece of land. Obviously, such a suggestion is absurd. In order to keep costs within the realm of possibility and to insure uniformity of work, it is necessary that definite features be mapped, and in units that can be given rather strict descriptions with as little personal interpretation as possible. The general nature of the country and the broad types of possible utilization will determine, somewhat, the nature of the information required, both for the land classification and for the study of land utilization.

In general, the work of classification can be said to have the following consecutive steps: (1) accurate mapping, in detail, of the important physical features of the land; (2) the determination of the use to which the various combinations of features are best adapted; and (3) the evaluation of each individual tract of land according to its capabilities within its use-group.[3]

The Method Developed for Western North Dakota

The board of county commissioners of McKenzie County, North Dakota, asked for a classification of the lands of that area on the basis of the soil survey.[4] This particular County, located on the western boundary of the State, is an excellent territory for such a trial survey. There are about 3,000 square miles in the County with large tracts of good agricultural land and typical grazing land. A great portion of the County has arable and non-arable land occurring together in such complexity that only a detailed survey could show the strongly

[3] This statement, and the method described in this paper, take no account of improvements on farms and ranches. Under the laws of North Dakota these improvements, such as building and fences, are exempt from taxation. In areas where they are taxed, an assessment of them would need to be made and added to that of the land.

[4] The soil survey (and other field work) is being done by the Bureau of Chemistry and Soils of the United States Department of Agriculture, with the State Agricultural Experiment Station cooperating. The State organization is making the land classification from these maps. Funds are furnished by the County to pay for the State expense. Other counties are asking for a similar survey under like conditions.

In 1921 a law was passed by the State Legislature of North Dakota authorizing the county commissioners to appropriate money for surveying and classifying th rural lands within the county for purposes of assessm (North Dakota Session Laws 1921, Chap. 121, Bi S 48.)

contrasting conditions. Erosion has been very pronounced in places and some of the wildest of the Badlands is included in the area. Great variations also occur in the soils.

In McKenzie County, grazing and farming, either separate or combined, are the chief uses to which the lands are put. For the purpose of land utilization studies and for the land classification the following information is being mapped on a scale of two inches to the mile:

1. *Base Map.* The ordinary base map, showing the important physical and cultural features, is prepared.
2. *Soil Map.* The soils are mapped according to series and types as defined by the modern system of soil classification.
3. *Lay of the Land.* The lay of the land is mapped in four groups as follows:
   - A. Level or slightly sloping land. (About 0 to 2 degrees of slope.)
   - B. Undulating to gently rolling land, having some slope but not enough to interfere with the use of agricultural machinery or to cause any serious erosion. (About 2 to 5 degrees of slope.)
   - C. Rolling to strongly rolling land, having such slope that heavy agricultural machinery cannot be used successfully. (About 5 to 10 degrees of slope.)
   - D. Hilly land that is unsuitable for any sort of agricultural machinery and can only support native forage vegetation. (Over 10 degrees of slope.)
4. *Grass Cover.*[5] In the D class of "lay of the land" there is considerable variation in the amount of grass cover, consequently:
   - D is used to indicate that the area is approximately 95% grassed.
   - D_1 indicates 75 to 95% grass cover.
   - D_2 indicates 50 to 75% grass cover.
   - Rough and broken land. This class includes those areas of hilly land having less than 50% grass cover.
5. *Stoniness.* In many areas, especially where the soils are developed from glacial drift, the degree of stoniness becomes an important item. In order to obtain some measure of this important factor, the number of ordinary wagon loads of stones per acre are estimated and shown as follows:
   - S_0 None to 2 loads per acre.
   - S_1 About 2 to 20 loads per acre.
   - S_2 About 20 to 50 loads per acre.
   - S_3 Above 50 loads per acre.
6. *Drainage.* Streams and drainways are shown in the following classes:
   - (a) Large rivers are shown on the map to scale.
   - (b) Running streams, or intermittent streams having permanent water holes.
   - (c) Intermittent drainage ways which cannot be crossed with agricultural machinery.
   - (d) Intermittent drainage ways which can be crossed with agricultural machinery.
7. *Scabby Spots.* (Caused by differential erosion of Solonetz soils.) This important feature is peculiar to soils of the arid regions. Where the land is covered with these barren, shallow basins, its value is greatly reduced. Where any soil has a large area thus affected, a Solonetz phase of the soil type is mapped; if the area is small, a special symbol is used.
8. *Gravel.* Special symbols indicate erratic surface gravel.
9. *Shallow Soil.* Areas which have had the surface soil removed by erosion are indicated by symbol in cases where such erosion is not characteristic of the soil type mapped.
10. *Salty Spots.* Salty areas are indicated by symbol, as this land is less productive of either native or crop plants.
11. *Forest Growth.* Especially in bottom lands bordering such large streams as the Missouri River it is necessary to indicate the type, size, and density of the forest growth.

A few other minor symbols are employed for special features that may be important in any particular region. Further, any area which does not seem to be adequately described by the conventional symbols employed is described by the field men with special notes. The aim, however, is to work out the legend

[5] Funds were not available for the use of the more detailed and accurate method of estimating grass cover employed by the United States Forest Service.

in such a manner that field notes will rarely be needed. A much greater degree of accuracy and uniformity can be realized by the use of standard mapping symbols than by written notes. As a matter of fact, when copious field notes become necessary to any great extent, that in itself is sufficient evidence that the soil classification, or some other portion of the legend, is not logically arranged.

In order to map these features in sufficient detail it is necessary for the field men to travel over the land at intervals of one-quarter mile. Also it is necessary that some individual make frequent contacts with the various men in the field in order to insure uniformity of classification.

The next step toward land classification is a comparative rating of the various soil types with the different degrees of slope and of stoniness. Of course, any one soil type will rarely show each of the topographic features, and many soil types are not subject to stoniness. Each soil type does not necessarily take a different rating in the land classification; several types frequently are grouped under one value-class. After extended observation and consultation with people familiar with the land, a table is constructed showing how each combination of soil type, relief, and stoniness is to be rated in terms of the best agricultural land, or the ideal, as 100%. The ideal is basic for McKenzie County and, of course, is not necessarily translatable to other regions. For equalization between counties additional facts such as rainfall, length of growing season, and general marketing facilities would need to be considered. In Table I is shown a small portion of such a general guide table of basic ratings for McKenzie County.

For the work in McKenzie County, ideal grazing land is more or less arbitrarily set as 30% of ideal farming land, this latter being taken as 100%.[6] For the evaluation of lands in the grazing use-group extended observations regarding the character of the native vegetation on the various soils are made in

[6] According to the state law in North Dakota, authorizing the counties to make a land classification, ideal grazing land is set at 30% of ideal farming land. This figure seems to be satisfactory.

TABLE I. A PORTION OF THE GENERAL GUIDE TABLE OF BASIC RATINGS FOR THE SOILS OF MCKENZIE COUNTY.*

Symbol	Soil Type	Lay of the Land	Stoniness			
			S_0	S_1	S_2	S_3
15	Scobey Silt Loam	B	90–95 %	80–85 %	35–40 %	17½–20 %
15	Scobey Silt Loam	C	20–22½	20–22½	15–17½	10–12½
16	Scobey Clay Loam	B	75–80	70–75	30–35	15–17½
16	Scobey Clay Loam	C	20–22½	20–22½	15–17½	10–12½
16s	Scobey Clay Loam (Solonetz phase)	B	15–17½	15–17½	5– 7½	2½– 5
56	Patent Clay Loam	B	50–55	45–50	25–27½	10–12½
56	Patent Clay Loam	C	17½–20			
86	Alluvial Clay	A	22½–25			
46	Grail Silty Clay Loam	B	75–80			
35	Morton Silt Loam	B	75–80			
35	Morton Silt Loam	C	20–22½			
23	Bainsville Very Fine Sandy Loam	D	10–12½	These types are rarely stony.		
27	Bainsville Clay Loam	D	12½–15			
27	Bainsville Clay Loam	D_1	5– 7½			
28	Rough and Broken Land	....	0– 2½			
57	Patent Clay (Barren)	A to B	0– 2½			

* Ratings are shown in percentages of the ideal.

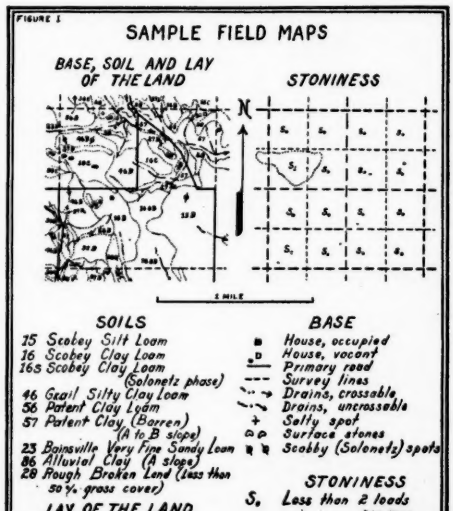
the company of experienced ranchers and range ecologists,[7] in order that the ratings may be indicative of the "carrying capacity" of the land for grazing live stock. All ratings are made on units of 40 acres for which the table of comparative ratings serves as a guide.

Rarely do these 40-acre tracts consist uniformly of one soil type. Before any forty may be considered as suitable for farming, arable land must be present in sufficient area to be conveniently handled. Thus, for example, areas of farming land of less than 5 acres are classified as grazing land; those of 5 to 10 acres are evaluated at ⅔ of their agricultural rating; and areas of 10 to 20 acres are rated at 85% of their agricultural rating as given in the general table. Uncrossable drainage ways and primary roads also have the effect of isolating small tracts of land. The above ratings are considered satisfactory in the general agricultural regions, but an area of 20 acres is considered the minimum size which permits a tract to secure any rating as farm land in the general region of grazing. Because of differences in native cover, soils that ordinarily would be classed as agricultural land might take grazing ratings below 30%, when small areas are classified in that use-group.

Further, the value of the land may be greatly influenced by such physical features as "scabby" spots, salty areas, drains, streams, and similar features. Rather definite percentages of subtraction or addition are allowed for each of these. Sources of water are, of course, of especial importance in the grazing areas. A flat percentage reduction of the valuation of each 40-acre unit is also made, depending upon its relative accessibility to markets. This percentage is relatively small and is applied after all other factors have been considered.

Although general guides can be drawn up for the classification of the important combinations of physical features, judgment must be exercised in cases of unusual nature. It is, therefore, of the utmost importance that the work of land classification be done by persons familiar with the landscape and with the field methods used in mapping the data. And, as in the case of the field work, some one experienced person must carefully examine the work to insure uniformity.

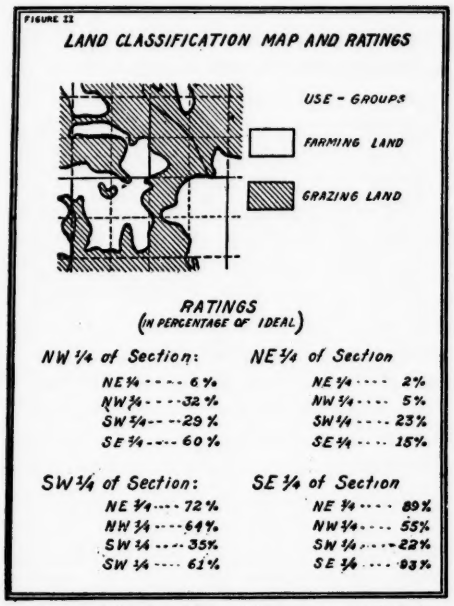
Figures I and II have been drawn to show the nature of the maps and of the process of classification. Figure I is a copy of the map of an ordinary section made in the field; this particular area has more detail than some, but less than many others. In Figure II is shown a



A copy of the field map of a typical section in McKenzie County, North Dakota. Note the complex pattern of soils having widely different character. The ratings for these soils are shown in Table I.

[7] For this work in McKenzie County, Dr. H. C. Hanson and Mr. M. B. Johnson, both connected with the State Experiment Station, gave valuable service.

generalized map for the use of the county commissioners, giving simply the classification of the land into use-groups. The ratings of the various forties in percentage of the ideal are shown. That portion of the general guide table which applies to this sample section is shown in Table I. The ratings of these units are determined by a consideration of the relative amount of the various soils and other features in each 40-acre unit.



A copy of the general map of the same area as that pictured in Figure I, showing the classification of the land into use-groups. The ratings of the various 40-acre units are given in percentages of the ideal for McKenzie County.

The wide differences between the various 40-acre units within the section show quite clearly the need for detail and accuracy. Likewise, a study of the map reveals both the difficulty and the necessity of establishing as definite guides as possible, in order to maintain uniformity. Every effort is made to eliminate individual judgment as much as possible after the bases for the classification are established.

If some plan of rural zoning should be considered as a part of a program of land utilization, this classification would serve as a guide. In fact, given the soil survey and the subsequent land classification, no additional field work would be needed to district the county and separate out the regions of present non-agricultural lands in which local governments might not be required to undergo the expense of schools and roads.

Summary

The requirements of a workable method for the classification of rural lands have been pointed out and a method which meets these requirements and which is being used in western North Dakota as a basis for assessment of taxes has been described with an example.

The classification of land is based upon the physical characteristics of the land and the experience in utilization:

(1) A detailed survey is made showing accurately the conditions of soil, lay of the land, stoniness, drainage ways, etc., on each 40-acre unit. Detailed information is necessary in order to yield a definite rating for each piece of land and to furnish a basis for formulating land utilization policies. This information, however, is of permanent character and as economic conditions change the land can be reclassified without an additional survey of its physical qualities.

(2) On the basis of the accumulated experience in the utilization of various types of land, each 40-acre unit is placed in the use-group for which it is best suited, and then given a relative rating within that use-group.

Although this particular method cannot be used in its entirety in a different land area, it is believed that one can be worked out along similar lines with minor changes to meet local conditions.

The soil map and the land classification furnish all the field data that would be required for a plan of rural zoning.

Depreciation by the Insurance Method

By J. F. BRENNAN

THE problem of the depreciation of physical property has two aspects, both of the greatest importance to managers, engineers, and auditors of public utilities: (1) provision of an annuity to replace the property at the end of its useful life; (2) establishment at intervals of the accrued depreciation for rate-making purposes. The regulatory activities of legislatures, courts, and commissions have brought to the front the importance of these questions and stimulated research and analysis of them, with the result that much has been said and written and many theories proposed and argued for their solution.

Out of all the discussion on the subject two general schools of thought seem to be emerging at present. On the one hand are those who hold the opinion that accrued depreciation has no relation to the accumulation in the depreciation reserve, and that it may be estimated only upon inspection by competent engineers. In this contention they are sustained by verdicts of the higher courts which have repeatedly repudiated the age and life method of measuring depreciation. On the other hand, we find those who contend that the present fair value of any property depends in part upon the company's future financial obligation to provide funds for replacements when and as they may become necessary; thus they urge that accrued depreciation and the depreciation annuity are but two phases of the same problem and cannot logically be dissociated.

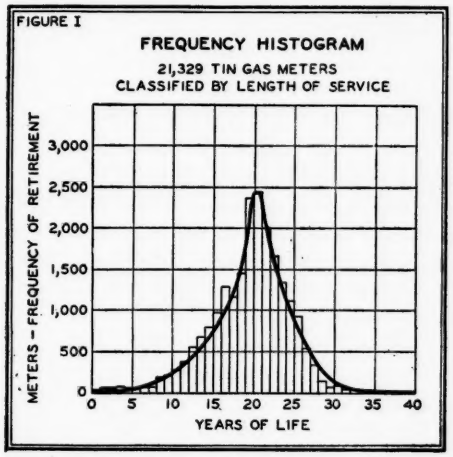
Protagonists of the latter theory have advanced many methods of putting it into effect, chief among which still in use are the "sinking fund method" and the "equal annual cost method." Both of these the courts have from time to time seen fit to reject, handing down opinions reflecting distrust of life tables upon which such methods are predicated. This attitude has not, however, deterred investigators from collecting and assembling data on the life history of all types of physical property, with the clear conviction that a scientific method must be found for the solution of the depreciation problem.

The classification of such data has revealed the fact that the rate of retirement of like units of property exposed to similar service and hazards obeys a marvelously well-defined law, somewhat similar to the mortality law of human beings. This fact suggested the use of life insurance methods for the computation of depreciation in physical property. The insurance method, or actuarial science as it is called, is simply the application of the doctrine of probabilities to monetary indemnity. It may be used only where large numbers of similar units are involved, since the theory of probabilities is reliable only "in the long run." Also the method is especially applicable to those classes of property in which the "death rate" is not subject to technological hazards, but this precaution inheres in the data, rather than in the method here described.

The insurance method offers a means of measuring both the depreciation annuity and the accrued depreciation by one single device. Thus the two results are interlocked and susceptible of exact mathematical demonstration, providing, of course, that the underlying principle

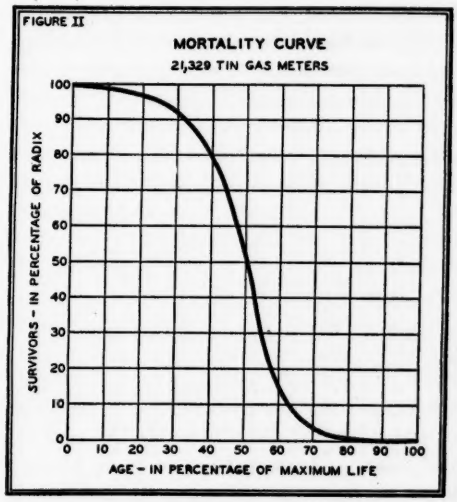
is accepted. Before discussing the results and their reasonableness let us glance briefly at the details of their development. We must first consider the fundamental statistics upon which the results are based.

Figure I shows in the form of a frequency histogram data as taken from the records of a large gas company. These data express the actual experience of the company with 21,329 tin gas meters whose complete life histories were known.



The desirability of representing these data by a smooth curve led to attempts to fit to them a standard type of empirical frequency curve. These attempts were unsuccessful, probably because of the intrinsic character of the data, or sample. Thus the normal law, the Poisson law, the Gram-Charlier series, and the Pearson Type IV curve failed to yield reasonable results. All these except the last gave an unsatisfactory "chi-square goodness of fit," while the Pearson curve failed to account for the behavior of the data in the first eight years. The smooth curve in Figure I is, therefore, a curve fitted by judgment. It retains the general asymmetry of the data, a characteristic whose arbitrary elimination is not justifiable. It conforms to the fundamental requirement that the area under the curve must equal that of the histogram, but naturally its usefulness is limited inasmuch as its equation and characteristics are not defined mathematically. For the present purpose, however, it appears to be within allowable limits of error.

No attempt was made to fit a type curve to the cumulative frequency or mortality histogram, although the utility of such a curve is recognized. It is recognized also that there are objections of a fundamental nature to the computation of a standard empirical mortality curve for such data as the statistics on the lives of physical property. A discussion of these objections is beyond the scope of this paper. Figure II shows a mortality curve plotted from the frequency curve of Figure I. Undoubtedly new data gathered from year to year will modify the shape of the curve to a certain extent; also further research on lives of other items of equipment may aid in determining the types of empirical frequency and mortality curves to be applied to meters. For the present we



may work with the curve of Figure I as defining the frequency of the retirement of tin meters, and we will now pass to a discussion of the theory by means of which we are to operate on the figures derived from the frequency curve.

The Insurance Method

Under this theory the company places itself in the position of an insurance company whose risks are gas meters. Whenever a new meter is installed, the company begins to pay into the reserve (for depreciation) an annual premium based on the cost of the meter, and this premium is continued every year during the service life of the meter. When a meter is retired, a claim in the amount of its cost arises against the reserve and is paid to the meter account. The method of calculating the annual premium may be developed as follows:

Suppose a company to undertake the obligation to pay a specified sum, say $10, at the end of a year, for every meter retired during the year. Assume 21,329 meters at the beginning of the year (the radix of Table I). From the table we note that 50 meters would be retired during the year, and therefore 50 claims would have to be paid, making the sum payable at the end of the year $500. The value at the beginning of the year of this amount would be the amount discounted at a certain rate of interest. At 6% this value would be $500 ÷ 1.06, or $471.70. The share of this amount which each meter would have to contribute as premium at the beginning of the year would be $471.70 ÷ 21,329 meters, or $0.0221. This is the simplest possible case of insurance, where the risks run for one year only, and where the premiums are paid at the beginning of the year and the claims at the end of the year. (As a matter of fact, all insurance claims are not legally due until the policy anniversary after the date on which such claims arise.) Algebraically the above calculation may be represented more simply. Let p_x represent the probability of survival of a meter for one year at age x; q_x, the probability of its retirement; l_x, the number of meters in service at age x; d_x, the number of meters retiring at age x (the notation here used is the standard actuarial notation wherein "l" stands for "living" and "d" for "dying"); v^x, the present value of 1 due at the end of x years at a specified rate of interest; then

$$q_x = \frac{d_x}{l_x}$$

or, using the meter data we have

$$q_0 = \frac{50}{21329} = 0.00234,$$

which is the probability that a new meter will not survive one year. The premium is the product of the probability of retirement q_0, the amount of the indemnity ($10), and the present value of one due at the end of one year; or

$$\text{Single premium} = d_0 \times \$10 \times v^1 = 0.00234 \times 10 \times 0.94340 = \$0.0221,$$

as above.

Suppose now that a company under takes to insure 21,329 meters at $10 each for their entire service lives in consideration of one single premium paid at the beginning of the contract. We wish to know what will be the single premium per meter for this protection:

Examination of the retirement column (d_x) of Table I will show the number of meters that will be retired each year. Thus the claims arising during the years will amount to 50 × $10 or $500 the first year, $510 the second year, $520 the third, $550 the fourth, and so on up to the fortieth year when all the meters will have been retired. The present value of all these claims would be the total amount of money which the company would have to receive in one sum at the beginning of the contract in order

to meet the claims as they appear. Algebraically this means that total single premium $= \$500 \times v^1 + \$510 \times v^2 + \$520 \times v^3 + \ldots$. etc.

This total single premium must then be divided equally by the 21,329 meters to obtain the single premium per meter. Thus, if A_x represents the single premium of an insurance at age x for an indemnity of \$1, then

$$A_x = \frac{v^1 d_x + v^2 d_{x+1} + v^3 d_{x+2} + \ldots . \text{ etc.}}{l_x}$$

The calculation of the single premium from the above formula would involve much work, since it would necessitate a computation for every year in which meters were retired up until the entire radix were exhausted. Moreover, the formula cannot be used for calculating premiums at ages of $x+1$, $x+2$, etc. We are unable to eliminate much of the labor of the first computation, but we can transform the formula algebraically to obtain the latter result quite simply. The following device is used: multiplying the numerator and denominator of the right hand member of the above equation by v^x, we obtain

$$A_x = \frac{v^{x+1} d_x + v^{x+2} d_{x+1} + v^{x+3} d_{x+2} + \ldots \text{etc.}}{v^x l_x}$$

Now if $v^{x+1} d_x$ be represented by C_x, $v^{x+2} d_{x+1}$ by C_{x+1}, and in general $v^{x+n+1} d_{x+n}$ by C_{x+n}, and further if $v^x l_x$ be represented by D_x, then the formula for the single premium becomes

$$A_x = \frac{C_x + C_{x+1} + C_{x+2} + \ldots \text{etc.}}{D_x}$$

If now the values of C be summed up continuously starting at the last, that is, adding the second-last to the last, the third-last to the sum of these two, the fourth-last to the sum of these three, etc., then we will have another column called M_x, which gives opposite any age the sum of the values of C from that age up to the greatest age. The single premium at age x for an indemnity of 1 at retirement may then be written

$$A_x = \frac{M_x}{D_x}$$

A better understanding of the computation of C_x and M_x may be gained by a glance at their columns in Table I. These columns are called "Commutation Columns" and are summed consecutively from the bottom upwards. It is easily seen that the above reasoning is perfectly general and that x may represent any age in the table and not simply age zero, such as has been used in the numerical example given.

In order to convert the single premium to an annual premium payable during the life of each meter, we may proceed as follows:

Suppose that for each meter during its entire life the company should pay a yearly premium or annuity of \$1. At the end of the first year we note from the table that there would be 21,279 meters still in service. The total premium would therefore amount to \$21,279. Similarly, at the end of the second year the amount would be \$21,228, the third year \$21,176, and at the end of the xth year l_x dollars, the amounts payable each year diminishing as the number of survivors dwindles. The present value of the sum of all these premiums or annuities *payable at the end of the year* would be

$$v l_{x+1} + v^2 l_{x+2} + v^3 l_{x+3} + \ldots$$

and if this present value were divided equally among all the meters, we would have the present value for each meter of an annuity of 1 (or a_x) payable at the end of each year, or

$$a_x = \frac{v l_{x+1} + v^2 l_{x+2} + v^3 l_{x+3} + \ldots}{l_x}$$

Multiplying both the numerator and

TABLE I.—TIN GAS METERS: MORTALITY AND COMMUTATION

Radix = 21,329

Age	Actual Data		From Curve		Present Value of One at 6%	C_x	M_x	Present Value of One at 6%	D_x	N_x	Annual Premium P_x $\frac{M_x}{N_x}$	Single Premium A_x $\frac{M_x}{D_x}$	Present Value of Life Annuity of One Due a_x $\frac{N_x}{D_x}$	Pres. Value of Fut. Prems. at Age x on Pol. taken at Age 0, for $1 Indemnity. $P\,a_{0\,x}$	Policy Value, or Accrued Depreciation $V_{n\,x}$ $A_x - P\,a_{0\,x}$	Condition $\%_V(1-n\,x)$ $= \frac{a_x}{a_0}$	Age
x	Number Surviving at Age x	Number Retired during Year	Number Surviving at Age x l_x	Number Retired during Year d_x	v^{x+1}	$v^{x+1}d_x$	$\Sigma_{39}^{x} C_x$	v^x	$v^x l_x$	$\Sigma_{39}^{x} D_x$							x
0	21,329	35	21,329	50	0.94340	47.17000	6,958.25169	1.00000	21,329.000	253,883.601	0.027407	0.326234	11.9032116	0.326234	0.000000	1.000000	0
1	21,294	53	21,279	51	.89000	45.39000	6,911.08169	.94340	20,074.609	232,554.601	.....	.....	11.5845145	.....	.....	.973226	1
2	21,241	59	21,228	52	.83962	43.66024	6,865.69169	.89000	18,893.920	212,479.992	.....	.....	11.2465406	.....	.....	.944832	2
3	21,182	76	21,176	55	.79209	43.56495	6,822.03145	.83962	17,779.703	193,587.072	.....	.....	10.8880385	.....	.....	.914714	3
4	21,106	64	21.121	58	.74726	43.34108	6,778.46650	.79209	16,729.733	175,807.279	.....	.....	10.5086721	.....	.....	.882843	4
5	21,042	45	21,063	68	.70496	47.93728	6,735.12542	.74726	15,739.537	159,077.546	.....	.....	10.1068758	.....	.....	.849088	5
6	20,997	74	20,995	86	.66506	57.19516	6,687.18814	.70496	14,800.635	143,338.009	.....	.....	9.6845850	.....	.....	.813611	6
7	20,923	80	20,909	115	.62741	72.15215	6,629.99298	.66506	13,905.740	128,537.374	.....	.....	9.2434760	.....	.....	.776553	7
8	20,843	185	20,794	160	.59190	94.70400	6,557.84083	.62741	13,046.364	114,631.634	.....	.....	8.7864813	.....	.....	.738161	8
9	20,658	208	20,634	210	.55839	117.26190	6,463.13683	.59190	12,213.265	101,585.270	.....	.....	8.3176177	.....	.....	.698771	9
10	20,450	292	20,424	280	.52679	147.50120	6,345.87493	.55839	11,404.557	89,372.005	.071005	.556433	7.8361170	.214777	.341656	.658353	10
11	20,158	380	20,144	375	.49697	186.36375	6,198.37373	.52679	10,611.678	77,967.448	.....	.....	7.3473389	.....	.....	.617257	11
12	19,778	548	19,769	494	.46884	231.66696	6,012.00998	.49697	9,824.5999	67,355.770	.....	.....	6.8558303	.....	.....	.575965	12
13	19,230	580	19,275	625	.44230	276.43750	5,780.40302	.46884	9,036.8910	57,531.190	.....	.....	6.3662591	.....	.....	.534835	13
14	18,650	799	18,650	770	.41727	321.29790	5,503.96552	.44230	8,248.8950	48,494.299	.....	.....	5.8788842	.....	.....	.493891	14
15	17,851	962	17,880	925	.39365	364.12625	5,182.66762	.41727	7,460.7876	40,245.404	.....	.....	5.3942567	.....	.....	.453177	15
16	16,889	1,299	16,955	1,092	.37136	405.52512	4,818.54137	.39365	6,674.3318	32,784.6163	.....	.....	4.9120417	.....	.....	.412665	16
17	15,590	1,159	15,863	1,260	.35034	441.42840	4,413.01625	.37136	5,890.8837	26,110.2805	.....	.....	4.4323198	.....	.....	.372363	17
18	14,431	1,438	14,603	1,530	.33051	505.68030	3,971.58785	.35034	5,116.0150	20,219.3968	.....	.....	3.9521769	.....	.....	.332026	18
19	12,993	2,360	13,073	2,360	.31180	735.84800	3,465.90755	.33051	4,320.7572	15,103.3818	.....	.....	3.4955405	.....	.....	.293664	19
20	10,633	2,442	10,713	2,415	.29416	710.39640	2,730.05955	.31180	3,340.3134	10,782.6246	.253191	.817306	3.2280278	.088471	.728835	.271190	20
21	8,191	2,003	8,298	1,980	.27751	549.46980	2,019.66315	.29416	2,440.9397	7,442.3112	.....	.....	3.0489533	.....	.....	.256145	21
22	6,188	1,655	6,318	1,655	.26180	433.27900	1,470.19335	.27751	1,753.3082	5,001.3715	.....	.....	2.8525341	.....	.....	.239644	22
23	4,533	1,325	4,663	1,325	.24698	327.24850	1,036.91435	.26180	1,220.7734	3,248.0633	.....	.....	2.6606603	.....	.....	.223525	23
24	3,208	1,108	3,338	1,065	.23300	248.14500	709.66585	.24698	824.41924	2,027.2899	.....	.....	2.4590531	.....	.....	.206587	24
25	2,100	914	2,273	830	.21981	182.44230	461.52085	.23300	529.60900	1,202.8707	.....	.....	2.2712429	.....	.....	.190809	25
26	1,186	523	1,443	605	.20737	125.45885	279.07855	.21981	317.18583	673.26166	.....	.....	2.1159385	.....	.....	.177762	26
27	663	323	838	400	.19563	78.25200	153.61970	.20737	173.77606	356.07583	.....	.....	2.0490500	.....	.....	.172143	27
28	340	140	438	205	.18456	37.83480	75.36770	.19563	85.68594	182.29977	.....	.....	2.1271342	.....	.....	.178736	28
29	200	57	233	104	.17411	18.10744	37.53290	.18456	43.00248	96.61383	.....	.....	2.2467037	.....	.....	.188748	29
30	143	60	129	56	.16425	9.19800	19.42546	.17411	22.46019	53.61135	.362339	.864884	2.3869500	.065420	.799464	.200530	30
31	83	36	73	27	.15496	4.18392	10.22746	.16425	11.99025	31.15116	.....	.....	2.5980409	.....	.....	.218264	31
32	47	29	46	13	.14619	1.90047	6.04354	.15496	7.12816	19.16091	.....	.....	2.6880583	.....	.....	.225826	32
33	18	3	33	11	.13791	1.51701	4.14307	.14619	4.82427	12.03275	.....	.....	2.4942115	.....	.....	.209541	33
34	15	3	22	8	.13011	1.04088	2.62606	.13791	3.03402	7.20848	.....	.....	2.3758841	.....	.....	.199600	34
35	12	4	14	4	.12274	.49096	1.58518	.13011	1.82154	4.17446	.....	.....	2.2917202	.....	.....	.192530	35
36	8	3	10	4	.11579	.46316	1.09422	.12274	1.22740	2.35292	.....	.....	1.9169953	.....	.....	.161049	36
37	5	4	6	3	.10924	.32772	.63106	.11579	.69474	1.12552	.....	.....	1.6200593	.....	.....	.136103	37
38	1	1	3	2	.10306	.20612	.30334	.10924	.32772	.43078	.....	.....	1.3144758	.....	.....	.110430	38
39	0	.....	1	1	.09722	.09722	.09722	.10306	.10306	.10306	.943334	.943334	1.0000000	.027407	.915927	.084011	39
40	.....	.....	0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.000000	.000000	40

the denominator of the above fraction by v^x, we obtain

$$a_x=\frac{v^{x+1}l_{x+1}+v^{x+2}l_{x+2}+v^{x+3}l_{x+3}+\dots}{v^x l_x}$$

From the definition given D_x (*supra*) it will be observed that the equation may now be written

$$a_x=\frac{D_{x+1}+D_{x+2}+D_{x+3}+\dots}{D_x}$$

If the column D be summed consecutively from the oldest age in the table (see Table I), as was done in the case of columns C and M, and the results tabulated in another column N, we then have the very simple expression for the annuity

$$a_x=\frac{N_{x+1}}{D_x}$$

where a_x represents the annuity which is payable at the end of the year. Since it is desirable to start the premiums at the beginning of the service life, we may convert this to an annuity payable at the beginning of the year (denoted by *a*) by adding 1, the first payment made immediately, to it; thus

$$a_x=1+a_x$$
$$=1+\frac{N_{x+1}}{D_x}=\frac{D_x+N_{x+1}}{D_x}=\frac{N_x}{D_x}$$

This expression then represents the present value of an annuity or premium of $1 for a meter aged x years, to be paid at the beginning of each year during which the meter survives.

Denoting the annual premium to be paid for each meter by P, we may obtain the present value per meter of the total premiums paid for its risk during its life, by multiplying P by the present value of a premium of 1 per meter, that is $P_x \times a_x$.

By the fundamental proposition of insurance that the present value of the premiums must equal the present value of the risk, and noting that the present value of the risk is simply the present value of the claims to be incurred divided by the number of risks, that is, the single premium per meter A_x, we have the equation

$$P_x a_x=A_x$$

whence
$$P_x=\frac{A_x}{a_x}=\frac{M_x}{D_x}\times\frac{D_x}{N_x}$$

or
$$P_x=\frac{M_x}{N^x}$$

which is the annual premium payable at the beginning of each year for an insurance taken out at age x, for an indemnity of $1 to be paid at the end of the year in which the meter is retired from service. The premium column P in Table I has not been completely filled out for the reason that it is unlikely that any of the premiums except that for a new meter (of age zero) would be necessary. In introducing the insurance method of depreciation an organization would apply it only to new equipment when and as such new equipment went into service, as otherwise some complex accounting problems would arise, particularly if the existing depreciation reserve were felt to be inadequate. If the reserve were adequate, the entire meter account could be changed over without hazard and then the entire P column would be necessary, always with the assumption that the ages of all meters in service were known.

The premiums P are calculated for an indemnity of $1 and, since the indemnity in this case is the cost of meters, we may obtain the total annuity for meters of age x by multiplying the investment in dollars in such meters by the premium for age x, or P_x in the table. In other words, the premiums or annuity rates of the table are shown in dollars per dollar of meter cost.

Comparison with the Sinking Fund Method

The annuity computed by this method may now be compared with that com-

puted by the sinking fund method. For a new meter the insurance method gives an annuity per dollar of cost of $0.0274 (Table I). Under the sinking fund method it is first necessary to calculate the weighted average life. This is done from the original data, and in the case of the meter statistics is 19.9 years. Using 20 years, we find the 6% annuity to be $0.0257 which is $0.0017, or 6.2% lower than that yielded by the insurance method. This means that the reserve calculated by the sinking fund method would be inadequate to meet the replacement requirements, and illustrates very strikingly the inaccuracies produced by dealing with averages in financial transactions where compound interest is involved. It is not claimed that the insurance method always produces the higher annuity; indeed, it will in certain arrangements of the statistics give a lower annuity. It does, however, always yield the exact sum necessary for the retirements.

Table I has been computed on a 6% basis, principally for the purpose of making comparisons with the sinking fund results. It appears, however, that 4% would be a more reasonable rate on which to base such computations. A company should not be required to set up on its reserve an interest which in many cases exceeds the return which the property itself enjoys. The maintenance of the integrity of the investment is a duty owed by the management to the public which it serves, and is not less important than the obligation of a life insurance company to its policyholders. This obligation has been recognized by the laws of the states, many of them ordering an interest rate of 3½% to be used in actuarial computations as a conservative measure to maintain the solvency of the companies and to protect their patrons.

Passing now to the consideration of accrued depreciation, we find that under the insurance concept it corresponds to what is known as the net policy value. At the beginning of an insurance contract the present value of the risk must equal the present value of the annual premiums. This is, in fact, the basic proposition from which we derived the formula for the annual premium above, $P_x a_x = A_x$. Now as the years pass, the time when the claim will have to be paid draws nearer, and consequently the value of the liability increases. Thus A_{x+n}, the present value of the risk, grows larger as the years n increase and the time of payment approaches. On the other hand, the value of the future premiums decreases with the years, since the amount of the premium is constant, and the number of them to be paid is diminishing. There is no longer equality between the two quantities $P_x a_{x+n}$ and A_{x+n}, and the difference between the two after n years, denoted by ${}_nV_x$, is the policy value. That is,

$$ {}_nV_x = A_{x+n} - P_x a_{x+n} $$

This equation expresses algebraically the fact that in the early years of the contract the premiums exceed the risk, and the accumulation of the excess (the policy value) is carried along at compound interest to balance the deficiencies in the late years wherein the risk exceeds the premiums paid. In other words, the young pay the deficient premiums of the old, a necessary condition where the premiums remain constant.

To illustrate, suppose that a meter which was placed in service at age x and insured for retirement is sold at age x+n. During the first part of the n years the premiums (or depreciation annuities) paid for the meter would have been accumulating an excess over the risk for the early years. This excess represents the amount which the present value of

the future premiums at age x+n is deficient in meeting the present value of the risk at that age. Therefore, if the buyer wishes to continue the annuities for the meter at the same rate as was being paid before the purchase, he must deposit into the reserve a lump sum equal to the above mentioned excess, so that when retirement occurs he will be able to meet it. Thus the excess premium or policy value is an accrual which measures *for a group* a company's present obligation to effect a future retirement, attributable to a portion of a service life lived in the past. It may, therefore, be used as the measure of accrued depreciation. It expresses nothing as to the condition of any particular unit, but indicates only the situation with respect to the whole group of units. Thus it gives effect to the consideration that there is a value, less than the cost, attached to a group of new units in 100% condition today, if it be reasonably certain that a number of them will be destroyed by accidents tomorrow. It is not a quantity entirely apart from and independent of the depreciation annuity for the reason that it measures exactly that portion of the depreciation which the future annuities will lack in providing for the full retirement.

We have then the above formula for ${}_nV_x$ expressing the accrued depreciation, and $1-{}_nV_x$ denoting what we may term the condition per cent. Table I gives these quantities expressed in percentage of the cost, or, what is the equivalent, calculated for an indemnity of 1. The accrued depreciation and the condition per cent columns of the table are computed for meters going into service at age zero, and they give the percentages for such meters at the *beginning* of the year shown in the age column.

We may now compare the results obtained by the insurance method with those of the straight line and sinking fund methods. Using the weighted average life of 20 years, as computed from the meter data, we obtain the following condition percentages:

Age	Straight Line	6% Sinking Fund	6% Insurance Method
3	85.0%	91.4%	91.5%
5	75.0	84.6	84.9
8	60.0	73.2	73.8
10	50.0	64.1	65.8
13	35.0	48.4	53.5
15	25.0	36.7	45.3
18	10.0	16.0	33.2
20	0.0	0.0	27.1
30	0.0	0.0	20.1

After 20 years' age the straight line and sinking fund give 0% condition, and it is necessary to find another means of assigning conditions to units still in service. This is sometimes done by arbitrarily lengthening the total life in order to get those over the average into the picture. Another device often employed is that of adopting a minimum service condition of from 10 to 20%. Here again we find averages leading to results difficult to support.

The use of an interest rate lower than 6% for computing the commutation table would tend to lower the condition percentages obtained by the insurance method, whereas the annuities calculated by this means would be increased.

The reliability of results obtained by the insurance method depends, of course, upon the accuracy of the basic statistics and upon the extent of the radix. It is generally possible by statistical mathematics to test the reliability of certain of the data. The size of the radix necessary to yield results within certain limits of error may also be determined. These calculations do not, however, relieve the statistician from the necessity of using

careful judgment in the selection and the rejection of data.

It is to be expected that the mortality table will change slightly from year to year as more experience is gained. We should not, however, expect any radical change in the meter curve, because of the size of the present radix, and also for the reason that there is not likely to be any change either in the design of tin meters or in their service operating conditions. The record of the past may in this case be relied upon to furnish a very good knowledge of the future. Gradual variation in the characteristics of the meter curve will affect the meter annuities from time to time, but sudden changes sufficient to alter substantially the reserve situation would be highly improbable, and would have to come in that form of calamity generally described as an act of God.

The insurance method takes no note of the causes of retirements, whether they be the result of accidents, physcial deterioration, inadequacy, or obsolescence. It covers all the natural influences which affect the retirement of the units, and is entirely independent of judgment and opinion when once its basic principles are accepted. In so far as the annuity is concerned, its bases and processes are above cavil. With respect to the method here proposed for measuring accrued depreciation, it must stand or fall on the principle that present value is not independent of future financial obligation.

Some Unsolved Problems in High Building

By HERBERT S. SWAN

EUROPEAN cities are built up solidly to a given, uniform height within each zone, from the core of the city to the rim. The permissible legal height and the actual building height within each respective zone tend to be identical.

How different are our own arrangements! Except in the one-family-house zones, where the height is restricted to two-and-one-half stories, there is, in entirely too many cities, but a very faint relationship between the permissible legal height and the actual building height in many of the zones. In the apartment-house zone, let us say, the legal height limit is six stories. Yet in these very same zones, nine-tenths of the land is very often occupied, if occupied at all, by one-family dwellings. Only an occasional apartment house rises to the permitted legal height of six stories. In the downtown business district, the situation is usually still worse. There, whatever the legal height limit may be for the zone, especially outside our biggest cities, only a few buildings reach the limit; the great majority of buildings stop before they reach the maximum permitted height.

Some apologists for high buildings are innocent enough to insist that high buildings as such are beautiful. Nothing could be more erroneous. High buildings are essentially no more beautiful than low buildings. They possess, as such, no more grace, no more symmetry, no more beautiful lines than do low buildings. A glance at the facades of almost any street in the downtown section of a large city will convince one of this fact. But even where high buildings possess exceptional architectural merit, they all too often ignore the reciprocal rights of other buildings with reference to light, air, and view. To the innocent bystander it has sometimes appeared that property owners have even experienced in some cases a certain demoniac glee in putting up high structures which would blanket a particularly attractive building in the vicinity as, for example, the Singer Tower by the Benenson Building. Such lack of respect for the rights of others can, of course, have but a prejudicial effect upon the whole locality, including the property of the one who violates the amenities of the community, but this is a matter which many of our real estate owners are not sufficiently educated to understand.

Probably in no single respect has zoning failed more signally than in restricting the height of commercial buildings. This fact is all the more remarkable since the very first attempts in zoning were directed toward limiting the height of skyscrapers.

The average American is not as yet educated to a point where he appreciates either the social or the economic problems created by the giant skyscraper that covers practically the entire lot. On the contrary, he is actually proud of the high building, and the higher the buildings are, the more proud he is of them. Until the average citizen realizes the true significance of the problem developed as a result of the high building, it is altogether likely that our height regulations will leave much to be desired.

A fair amount of success has been met in regulating the height of residential

buildings. There the problem has, however, been not so much one of height control as of exclusion of the high building, particularly the apartment. But exclusion, in this instance, has very seldom been tantamount to prohibition or even to interference with desired practice; other well adapted zones have invariably been provided for the apartment. As the height limits in these zones have usually been adjusted to the height customarily required by local apartments, there has been exceedingly little complaint from apartment interests against the height limits as such. The complaints lodged by apartment builders against zoning have far more frequently been directed to the narrow limits of multi-family-house zones than to the height limits applicable to those zones.

But when considering the large office building and the hotel, an entirely different problem is presented. Any height limitation there, of course, has the effect of entirely prohibiting anywhere within the city buildings exceeding the prescribed height. The consequence is that commercial interests have quite often resisted any limitation which would effect the potential height of prospective buildings. They have also very frequently done everything in their power to secure the inclusion of as large an area as possible within the least restricted zone. These are disabilities affecting not an isolated ordinance, but constituting a real weakness of almost every zoning ordinance.

New Ideas Regarding Height Problems

Time is making it increasingly evident that in some respects we have misconstrued the problem of the high building. In the past, most communities have placed the emphasis upon height limitation and limitation at the lowest politic height. They have not, as a rule, succeeded in their attempt; more often than not the height limit imposed has been a very liberal one. Now, however, we are perceiving that the problem presented by the skyscraper is not one to be solved so much through height limitation as through exercising effective control over the bulk of high buildings. A high building erected as a tower, occupying a small percentage of the lot, is far more to be preferred than a lower building with the same bulk occupying the entire lot. There is no more congestion in one case than the other, but the tower enjoys vastly more light and air. That builders themselves are becoming conscious of this important fact is suggested by the change which has been wrought in recent years in the character of towers. Formerly the tower was more an incident or ornament to a huge building; relatively little rentable space was located in the tower. Now, on the other hand, the building itself tends to be a tower. Indeed, this evolution has gone so far that most of the building, in a number of cases, is included within the tower.

Height Limits

The first cities to restrict the height of buildings used a multiple of the street width as a basis for limitation. But it soon became evident that a multiple of the street width, however useful it might be as an auxiliary in preventing too high buildings on exceptionally narrow streets, was open to serious objections when relied upon as the principal means of curbing height.

Chief among the objections is that a multiple of the street width does not produce a uniform type of development throughout a district. A multiple of the street width allows higher buildings upon the wider streets and thus actually

invites the location of buildings which will not comport with the general character of a neighborhood. The fact that a very high building happens to be located on a wide street hardly mitigates the injury done to lower buildings in the immediate neighborhood that have their height controlled by narrower streets; the blight suffered by them is exactly the same no matter how wide or narrow the street is on which the high building fronts.

Basing the height regulations upon a multiple of the street width does not, of course, obviate the necessity of establishing several classes of height zones, each governed by its own multiple of the street width. The height limit in a particular case, therefore, varies not only according to the width of the street but according to the zone in which the building happens to be located. In applying the multiples of the original five New York height zones to only six sets of different street widths—50-, 60-, 70-, 80-, 90-, and 100-foot streets—one obtains no less than 22 separate and distinct height limits. As three additional height zones have been added in New York since the adoption of the original regulations, the number of separate and distinct height limits now permitted on these six street widths is even larger than it was at first.

There is often a greater difference between the height limits established for the widest and narrowest streets within a given zone than there is between the narrowest and widest streets in two different zones. Indeed, in many instances higher buildings are allowed on the wider streets in a zone apparently subjected to a stringent restriction than on narrower streets in a zone with a more liberal multiple.

To obviate such conditions as these, later ordinances, with proper exceptions for towers, have subjected buildings in different zones to a flat limitation of height. Although the flat limit has avoided many of the awkward difficulties resulting from a multiple of the street width, it has, because of being too liberal, fallen short of its potential performance in limiting the bulk of commercial buildings.

Towers

Many objections may be found to the New York height regulations but it is to their lasting credit that they did not prohibit towers. When the height of buildings was limited, New York possessed but three important towers—the Singer, the Metropolitan, and the Woolworth. Because of the grace, dignity, and beauty of these towers, it was generally felt that zoning, far from prohibiting such structures, should do everything possible to encourage an increase in their number. As a result, a clause was incorporated in the zoning regulations to permit towers covering not more than 25% of the lot area to rise to an unlimited height. This provision has proved to be one of the most felicitous in the whole zoning plan. Almost wholly because of this provision New York enjoys such distinction as it does today in the field of modern architecture. Had it not been for the tower privilege, all builders would probably have truncated their buildings to the vanishing point. But the right to erect a tower—a tower of unlimited height—has saved the city from such a hideous nightmare.

Today, although only 16 brief years have passed since the adoption of its zoning regulations, New York is everywhere becoming known as a city of towers. A galaxy of towers has risen in this short period such as the world has never known, nor probably ever will

know in any other city. Such towers as the New York Central, the New York Telephone, the Bank of Manhattan, the New York Life, the Irving Trust, the City Bank-Farmers Trust, the Heckscher, 60 Wall Tower, the Chrysler, the R. C. A., the Empire State, and Radio City now soar far above the old roofs of the city to heights undreamed of before. In one sense, these towers stand as monuments to the power and wealth of the city; in another sense, they stand as a symbol of the city's love for the noble and the beautiful. The majesty, the dignity, the radiant beauty of these towers represent the finest qualities of the soul of the metropolis, expressed in forms of steel and masonry. They constitute the city's finest contribution to the civilization of our time. And yet, but for a short paragraph in a city ordinance, all this might have been lost to posterity.

Setbacks

Some persons mistakenly attribute the towers of New York to the setback provisions of the zoning ordinance. As a matter of fact, very little relationship exists between towers and setbacks. The setback privilege, by enabling an owner to obtain the desired bulk at a comparatively low level, acts rather as a deterrent than as a stimulus to the erection of towers. One fact certainly stands out in bold relief. No satisfactory tower has been erected, since the adoption of the zoning plan, where the owners have not been obliged to sacrifice an enormous volume of cubage permitted by the regulations at comparatively low height levels. That the setbacks are responsible for the towers in New York is a popular fallacy which has been repeated so often that many believe it.

A setback obviously admits more light and air to the lower stories of buildings across a street than does a vertical wall of the same height. But, unless the setback angle is established with reference to the floor level of the opposite side of the street, each increment of height within the setback plane is bound to diminish the light enjoyed by the opposite side of the street. A proper setback should therefore assure to opposite buildings a constant volume of daylight regardless of the height of building within the setback plane.

The New York zoning regulations entirely ignore this principle. There in the highest height zone, for example, each foot of street width below the setback plane admits of two-and-one-half feet of building height. Above the setback plane, however, each foot of open space permits of five feet of building height. In this respect the setbacks put a premium upon the construction of high buildings occupying as much as possible of the lot area. When the center of the street is considered, the setback plane does preserve a uniform angle of light; but when the lower stories on the opposite side of the street are considered, which is the factor of real importance, each increase in height diminishes the angle of light. Viewed thus, the setbacks, of course, stultify themselves. To achieve their object, setbacks should clearly be proportioned in the same ratio as the height below the setback plane bears to the street width.

The most liberal height zone in New York, though ostensibly a two-and-one-half-times multiple of the street width, is actually, considering the additional height permitted by the setback ratio in so far as the ground story is concerned, quite a different regulation. Just what it is depends in each case upon the exact building height with reference to the particular street. With 1000-foot buildings on 100-foot streets, for example, it

would be a four-times regulation. In the case of 60-foot streets, the same multiple of the street width would be reached with 600-foot buildings. The daylight assured with such a multiple is, needless to say, practically nil. According to the Swan and Tuttle Daylight Tables,[1] the daylight received at the base of such a facade is but 2.98% of that enjoyed where there are no obstructing buildings opposite.

Whatever volume may be added to a building as a result of the setbacks must, in New York, be incorporated into the building, if at all, at the level defined by the setback plane. In other words, an owner who might choose to forego either part or all of the volume defined by the setbacks cannot add this space to his tower. A tower is restricted to 25% of the lot area at whatever height level an owner may choose to commence its construction, irrespective of whether or not the setbacks have been utilized.

In this respect the setbacks clearly penalize the construction of the most graceful type of tower. It is not without good and sufficient cause that architects have seldom combined the setbacks with an attractive tower. That it can be done, however, has been most successfully demonstrated by the New York Telephone Building. The New York Life Tower, though in itself a beautiful structure, illustrates the architectural penalty a building usually pays when it attempts to utilize the volume permitted by the setbacks outside the main tower.

Whether it may not be well to compensate owners who refrain from utilizing their allotted volume at the lower levels, by permitting them to enlarge the base of the tower by an amount that would absorb the unused cubage permitted in the main building, is a question that merits thorough examination.

Today, an inflexible setback and dormer provision is virtually forcing an arbitrary architectural design upon builders. It favors the construction of compact buildings, having ugly excrescences projecting beyond the natural facade and containing a maximum cubage at elevations near the street level; it penalizes the incorporation of this same identical cubage into high towers occupying a small part of the lot.

Theoretically and practically a setback, especially if it is defined by a line drawn from the opposite side of the street, should be a good thing; there is no inherent reason why it should compel the construction of ugly buildings. Judged, however, by its aesthetic results, it would, no doubt, be better had the setback never been thought of. To many persons it is a question whether a more ugly feature has ever been introduced into our commercial architecture. One might think that a regulation which has given us scores of building monstrosities, such as the Chase Bank, the Paramount Building, the French Building, and many of the buildings in the Garment Center, to mention only a few, would stand thoroughly discredited. Yet, that even the setback may be utilized to achieve dignity and strength in the facade of a high building has been proved beyond contradiction by the Shelton Hotel, which probably illustrates the most successful architectural use of the setback principle up to the present time.

But there is one beneficial feature of the setback that should not be forgotten; more light and air are admitted to the lower stories as a result of a setback than would be the case were there unrestricted height with no setback. The setback in New York may have perpetrated upon the city all sorts of

[1] *Architectural Forum*, November, 1918.

awkward, truncated, distorted shapes in the way of buildings, but it has saved the city from dozens of structures like the Equitable Building, covering practically the entire lot, and rising 30, 40, 50 stories flush with the street line. A provision that has saved the city from such a catastrophe cannot be said to be all bad.

Inner versus Outer Courts

An indirect result of the setback which should by no means be overlooked is the effect it has had upon the open spaces used to light and ventilate high buildings. In the older skyscrapers, small, dingy inner courts were far more commonly used than in the present setback building. As the upper stories must in the latter building recede from the street as they go up in height, an inner court is not nearly so convenient to use as an outer court. The result has been that in many cases a building has, in effect, been turned inside out; the core of the building, instead of being devoted to narrow light shafts, is now the part of the building that is carried up, while the courts are so placed that they open into the street. Above the point where the setback plane begins, the courts become shorter and shorter until they soon disappear entirely. The gain to light, air, and ventilation effected as a result of this revolution in the use of courts in high buildings is simply inestimable.

There are so many good aspects to the setback that it is all the more deplorable that the provision relating to its use in the zoning ordinance should be so rigid. Were it less inflexible there is reason to believe that architects would soon use it to design really beautiful and graceful buildings. A change that involves so much to the future appearance of the city should by no means be unnecessarily or unduly postponed.

Future Control of High Buildings

Towers lend variety to the skyline and embellish a city as few structures do. A single Chrysler Tower instills more civic pride than a hundred giant buildings like the Equitable, occupying substantially the entire lot. If sufficiently numerous, however, towers might very conceivably obstruct the light and ventilation of neighboring buildings. Up to the present it has been thought that their high cost of construction rendered this contingency very unlikely. Yet there are indications in several different localities of New York that this very thing is happening at the present moment.

To reduce any possible objection to them on this score, it is especially important that towers be suitably located on exceptionally large parcels, that they be surrounded with adequate open space, and that at the same time only light colored materials with a large coefficient reflection be used in their facades. A hundred-story tower built of black material might in itself be a work of art, but, reflecting no light, it must, in so far as its vicinity is concerned, be not a tower of light but a tower of gloom.

It is becoming increasingly evident that the tower should be restricted solely to exceedingly large parcels. Indeed, it is a question whether the smaller parcels had not better have their bulk limited to a comparatively low figure, possibly, say, the equivalent of a six-story building with an absolute maximum height of eight stories, in order to stimulate the assembling of large plots, with a view to erecting towers. Any kind of high building on a 25- or 50-foot lot is an architectural abomination. Such buildings are, except on corner lots, even now severely handicapped in the provision of required courts and yards. But corner lots should not serve

as sites for small buildings. They should be consolidated with interior lots to form suitable plots for large structures. The zoning regulations might go a long way farther than they do in not only stimulating the erection of better buildings, but in improving the appearance of the city through making it more worth while for owners to assemble larger plots for buildings and, more particularly, larger corner plots.

We may, perhaps in time, even come to the view that buildings with a bulk in excess of that contained in, say, a six-story building, should be allowed only on plots having an area of more than 20,000 square feet. But at the same time that large buildings were confined to large parcels, everything possible should be done to encourage buildings on small parcels to utilize their permitted bulk in a high building, rather than in a low one.

But how much bulk should be allowed buildings on large plots? Probably not more than what could be contained in a 12-story building covering the entire parcel. But the permitted bulk of the building at a height of more than six stories above the street would have to be contained in a tower occupying not more than 25% of the lot. Assuming that towers occupied the permitted 25% of the lot area, this would allow towers to be built to a height of 30 stories. Correspondingly higher towers would be allowed in case the building had not utilized its permissible volume at lower levels.

But towers, in order that they may be permanent architectural assets to the city, should be restricted to such locations that they may be permanently seen to advantage. To achieve this result in a satisfactory manner demands, as a rule, an entire block front for each tower. Towers erected on smaller sites are, as has been evidenced by both the Singer Tower and the R. C. A. Tower, very likely to be screened from view by adjacent buildings.

Some arrangement like this would restrict the bulk of buildings to a point where their volume would not be utterly out of scale with the city's general plan. It would at the same time not only permit, but encourage, the erection of high buildings in such a manner as to make them permanently beautiful as well as useful. As time went on and additional high buildings were constructed, the earlier buildings would still be assured their required light and air.

Building Cities for Permanence

But not all of our unsolved problems in building are legal and architectural; some are financial and social.

The American in building seldom thinks of permanence; all that concerns him is whether he can write off the cost of building before the advance in the convenience and comforts offered by later buildings renders his present building obsolete. The result is that every building must have all the earmarks of ultramodernity. As modernity among most persons means something extremely different from what has gone before, it follows, of course, that new buildings must present as great a contrast as possible to the old. In other words, a primary purpose of new buildings must be not only to appear up to date but to make older buildings appear obsolete.

Race for High Buildings

A favorite method of accomplishing this end has been to build skyscrapers to an ever increasing height. Judging by the height of some of the more recent office buildings, the attempt seems to have been made to erect buildings to a height where they simply could not be built higher. How successful builders have been in reaching a maximum height

is evidenced by the fact that within a comparatively few months of its completion each "highest building in the world" has been overshadowed in height by a newer "highest building in the world."

Such silly striving for mere height may sooner or later be expected to bring about its own undoing, but, in the meantime, irreparable harm is done to the city. High buildings usually with at least two, and often three, unfinished facades cast their ugly blight to the farthermost ends of the city, if, indeed, not to the countryside beyond. The shadows cast by some of our most recent skyscrapers at noon in the winter solstice are dangerously close to half a mile in length. Since some of these buildings house from 10 to 30 thousand employees, the burdens they impose upon the thoroughfares and transportation facilities of the city are beyond all reason. These structures are seldom even a financial success; this last depression has seen more than a fair share of the higher buildings involved in foreclosure proceedings. It may or may not be true, as has been charged, that a primary object of some of these projects has been, not so much to afford the investor a profit, as to give certain bond houses an opportunity to merchandise securities at generous profits to the underwriters. Considering all the problems that have followed in the wake of the present-day skyscraper, one is almost at a loss to find a better reason for their being.

Theft of Tenants

The numerous vacancies caused among the older buildings by each new skyscraper in the vicinity show that the new buildings are not always built to anticipate an increased demand for office space. Indeed, the foundations for some of these buildings are barely laid before renting agents commence to hawk the prospective new space to the tenants of neighboring buildings. Very often the overtures made in this respect border upon the unethical. At least, the ugly charge is often heard that the new office buildings carry on deliberate campaigns to steal the tenants of nearby buildings. But whatever the origin of these vacancies may be, there can be no question as to their effect in the way of depreciated investment values, obliterated equities, and foreclosed mortgages. In many cases our large lending institutions have, no doubt, in effect financed foreclosures on their own mortgages through excessive advances in funds for the erection of unnecessary structures.

Fictitious Rents and Inflated Values

Such considerations are not confined to office buildings; they apply also to residential buildings. Since the war there has been a marked restraint in financing moderately priced apartments but, while they were still being constructed, instances were not unknown where all sorts of tricks were resorted to in fooling honest investors. Some apartment buildings were filled up through leases with secret concessions to the tenant in the way of one or two months' free rent. These fictitious rents were, of course, capitalized wherever possible in arriving at the price paid for the building by the unwary investor.

Profiteering in Real Estate

These operations unduly multiplied equities; many buildings were owned on a mere shoestring. They also had the apparent effect of inflating rentals and, as a result, tempted the innocent to put up still more buildings. The consequence was, of course, most demoralizing to the real estate market.

This mad, sordid race in real estate financing, construction, and selling was waged with but one idea—the maximum profit in the shortest possible time. Shoddy construction, jerry-building, racketeering in a dozen different ways flourished, all to the permanent prejudice of the city as a whole. Real estate developers locked arms with politicians; permits for what were actually illegal structures were in some instances put up on the auction block and sold in the guise of variances by the board of appeals to bribe-giving builders.

Laying the Foundations for Future Blighted Areas

Is it any wonder, under such circumstances, that much building in some cities has been essentially anti-social? That originally lax building regulations have been more laxly enforced? That whole areas have been blighted through the erection of buildings occupying an excessive proportion of the lot and stealing their light and air over the tops of other buildings? And that these evils have been grossly exaggerated through unsound methods of financing?

Surely no surprise need be expressed over the fact that such buildings are of doubtful benefit to the community. Owners of buildings none too well built in the first instance, after paying operating expenses, taxes, and interest on the customary two or three—sometimes four or five—mortgages ahead of their equity have had little money left over for maintaining their premises in a proper state of repair, or in a manner to attract and keep desirable tenants. Whole neighborhoods have, as a result, hardly been half built up before social decay has set in and plunged them into a sort of economic paralysis or blight from which they have but seldom been able to extricate themselves.

Rejuvenating New York's Lower East Side

Daring initiative has made our cities, despite all their faults, the most modern and efficient cities of the world. Yet our very enterprise sometimes leads us into some expensive errors. For a generation past New York, for instance, has been building subways with the avowed object of reducing congestion. Billions of dollars have been spent on hundreds of miles of rapid transit lines reaching to the remotest corners of the Bronx, Brooklyn, and Queens. As a result, hundreds of thousands who formerly lived in the slums of Manhattan have removed to the suburbs. During the past decennium, Manhattan lost no less than 450,000 of her population to the neighboring boroughs. So general is this exodus from the old city, that whole sections stand today in fear of depopulation. The Lower East Side, for example, lost 40% of its residents during the last decade. No less than a quarter of a million departed from the slums below 14th Street and east of the Bowery to make their homes in the new tenements constructed along the new transit lines. But at what a cost? Entire new communities have had to be built. Thousands of new apartments have been constructed where formerly there were but vacant fields. Water mains, sewers, pavements, totalling hundreds of miles in length, have been laid. Huge schools have, of course, had to be built to accommodate the redistributed school population.

Role of Lending Institutions in City Development

And now that the process of relieving East Side overcrowding has fairly started, what do we find? The very same savings banks and lending institutions which have financed the building of these

new suburban apartments, by making loans aggregating hundreds of millions of dollars, find that the equities back of their liens on East Side properties have been undermined to a point where the real estate in many instances is not worth the amount of the first mortgage. To resuscitate these loans on slum properties, the very same lending institutions which financed the exodus to the suburbs are today subscribing funds to inaugurate a trek back to the East Side. Tottering loans have at last made them see that a shifting of residence centers can be both constructive and destructive. It may mean better apartments, but these can also be built in the older sections of the city by the demolition of obsolete buildings unfit for human habitation, and their replacement with up-to-date, sanitary homes surrounded with adequate open space.

Responsibility of Lending Institutions for City Extravagance

In times of stress our financial institutions are rather free in criticizing what they term the extravagance of our municipal officials, but they conveniently forget that much of this so-called extravagance is part of their own doing; not a little of the wasted money has been spent in providing schools, water, sewers, pavements, and all the other prerequisites necessary to make the apartments financed by these very same institutions in the suburbs habitable; in other words, in duplicating in the suburbs facilities already existing in the old city, and made useless as a result of the exodus to the suburbs. If a little more vision characterized the lending policies of our financial institutions, it would redound not only to their own advantage, but to the benefit of every taxpayer. By liberal lending in certain sections, they can inflate realty values and stimulate good sized booms; by withholding much needed credit in other localities, they can induce such deflation as practically to blight a large area.

Building to Create a Demand

A big difference distinguishing development in America and Europe is that the European, in general, builds to fill a demand, while the American much more often builds to create a demand. The buildings constructed in Europe today are, with exceptions here and there, so far as outward appearances are concerned, not essentially different from those built hundreds of years ago. In America, however, the 20-story apartment and factory and the 100-story office building have already become actual realities. At the time these tall buildings were built there was no demand for them; the buildings were first built; the demand for them was created after their construction.

Initiative of the Individual Builder

This initiative and speculation which are the distinguishing traits of the American are both a bane and a blessing to our cities. On the one hand, they have led to a constant experiment with new forms and to the development of new ideas and new values in our architecture; stimulated employment and encouraged high wages; and, as a consequence, stimulated a distinct social advance, particularly in the improvement of general housing conditions. These qualities have made our cities the most modern and progressive cities in the world. In the less progressive cities of Europe, where this speculative instinct has been all but absent, the bulk of the population still live under what are practically medieval conditions. This difference in the basic conditions underlying the building industry on the two

continents helps to explain the virtual retirement of the private builder and the entrance of the municipalities with their socialistic programs into the field of general workmen's housing, as in Vienna.

Preservation of Historical Monuments in Europe

Some European cities have been so solicitous in preserving their ancient walls and historical monuments that they have almost forgotten that a new day has dawned in the world. In preserving the past, they have forgotten the present, with the result that entire cities have survived as the obsolescent relics of a dead past. This blind worship of the past has meant the religious preservation of so many things that cramp and distort the normal life of the community that it is one of the heaviest burdens the present has to bear. Where reverence for the past is allowed to paralyze progress, when all initiative and enterprise are geared to the life of the Middle Ages, is it indeed any wonder that these cities, instead of being alive, pulsating communities with eyes upon the living present, are more in the nature of museums devoted to exhibiting the mode of life of generations long dead?

Attachment to past romance and grandeur should never be permitted to shut us out from participating to the full in the more glorious activities of the present. Every generation owes it to itself no less than to posterity to live in as healthful and sanitary homes as its industry and earning power will permit. Yet in Europe today we find entire cities occupying houses unfit for human habitation, out of a false attachment to the past. The really beautiful and sentimental should, of course, always be tenderly cherished and handed down to posterity, but no city should permit itself to become a mere curator of indifferent things, just because they are old. In view of their decadent effect upon many European cities, we may well thank God that we have so few historical monuments to preserve in this country.

Change versus Progress

We in this country have at times been more interested in change than in progress. So long as we have changed things, we have not been overly inquisitive as to whether or not we have really progressed; change for change's sake, even though it has been change without progress, has characterized entirely too much city development.

In this respect, we have something to learn from the more progressive European cities. There they still restrict the height of buildings in the downtown district to the five and six stories that prevailed in the days of solid masonry construction, but the buildings nevertheless enjoy all the up-to-date conveniences of our own skyscrapers.

The conveniences and comforts of a building pertain, not to the outside, but to the interior. The European builds for permanence; he therefore finds it inadvisable to call particular attention to the facilities afforded in the way of steam heat or elevator service by giving the building an excessive height. He builds his new office building to exactly the same height as the old; although he may change the architectural form of the building, its height remains the same. In many instances, especially if the replaced building is a medieval one, the new building must have a facade, either exactly like, or in keeping with that of the old structure. But, even if such control is not exercised, there is no difference in the size of buildings; the new buildings are of

substantially the same height and bulk as the old. Even though hundreds of years may separate the building of different structures in a block, there is no more variation in the facades of the different buildings than that which may characterize the buildings in a similar length of street at home, all of which may have been constructed within a comparatively short period of years.

Almost two generations have elapsed since we, in this country, began to experiment in a big way with city building. Our experience has taught us many valuable and instructive lessons. But the best lesson it has taught us is that we still have many things to learn both about high buildings and about cities.

Residential Electric Rates in Wisconsin: A State-wide Picture

By E. W. MOREHOUSE*

THE growth of interconnected electric systems, serving a multitude of communities, has given rise to a host of different, though not altogether new, rate-making problems. Among these is the task of getting as much uniformity in rates charged in different communities as is possible without too great sacrifice of cost-of-service principles. I refer in this instance not to the *form* of the rate, i. e., block rate, room rate, connected load rate, etc., but to the unit price itself, or to the bill for given kilowatt-hour consumptions.

In this respect the practices of utility companies vary. Except for the industrial power market, where competition plays a large role and tends to force system-wide uniformity, very few companies now charge exactly the same rates in all communities regardless of size, character, load characteristics, location, etc. Most companies still have some degree of differentiation among the rates charged in various communities. This is especially true in the case of residential rates, where competition exerts less influence than in power markets, and is frequently true even when system operation has been established for some time. Some of these inter-community rate differentials are remnants of the days of isolated plant operation; some are explained more or less persuasively, on the ground of differences in the costs of rendering service; and some are based rather roughly on a classification of communities by size. This is not an exhaustive list of the factors affecting these differentials, but it will suffice.

The following material bears especially on rate differentials in communities of different sizes. The material constitutes only a general picture of what the residential electric rate structure of an entire state looks like from the standpoint of the spread of rates in the state as a whole and in communities of different sizes. It is only a snapshot taken in the autumn of 1932. As such, it summarizes the attainments of whatever trends have been at work in the past. But it does not directly show trends, except by inference, although a similar picture five years ago and five years hence might show interesting tendencies.

The Methods and Assumptions of This Analysis

Before presenting the figures and charts, and commenting briefly upon them, the reader should clearly understand the methods used and the major assumptions made. Perennial arguments take place as to whether customers pay more attention to the form of the rate, the size of the blocks, the top price, the bottom price or the spread between prices of different blocks, the gross or net rate, or the size of the total bill. We did not intend to resolve these arguments by choosing to compare bills. This choice was forced because of the necessity of finding a common denominator for comparison. Anyone who has compared electric rates realizes that

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there is considerable variety in rate-forms, i. e., in methods of quoting rates, to say nothing of variations in discounts for prompt payment of bills. On account of this variety of rates, the bills have been computed for certain kilowatt-hour consumptions at the net rates on file with the Public Service Commission. The consumptions chosen—20, 40, 60, 100, and 150 kw. hrs.—seem fairly representative of different degrees of use of electricity. No attempt was made to include rural residential or seasonal (summer cottage) rates; only incorporated communities were included. The grouping of communities into size classes, using 1930 Census of Population figures, was largely arbitrary and was made for convenience. After the net bill for each selected consumption was computed for the several communities in each size-group, a simple average of these bills was taken for the separate size-groups.

Because of the variety of rate-forms, certain assumptions had to be made in computing the net bills. These assumptions may be summarized briefly as follows:

1. Where connected load rates were effective, the most frequent size of first block, determined from recent consumer analyses in every instance except one, was used. These block sizes ranged from 8 to 15 kw. hrs.

2. Where room rates were based on a real estate count, 6 rooms were assumed.

3. Where an active room rate was in effect, 3 active rooms were assumed.

4. Where a combined lighting, heating, and cooking or general residential service rate was available, it was used at all consumptions except where the straight lighting rate or the combination of the lighting rate and the separate heating and cooking rate figured out to a lower bill.

5. In some communities a combination lighting and heating and cooking rate was not on file. In these cases, the lighting rate was used through 60 kw. hrs. For the 100- and 150-kw. hrs. steps the heating and cooking rate was applied to the consumption in excess of 40 kw. hrs.,—namely, 60 and 110 kw. hrs. respectively.

6. To determine the minimum bill for heating and cooking, a 5-kw. range was assumed. However, in small communities where no combination or special heating and cooking rate was filed and where the existing lighting rate obviously made electric cooking prohibitively expensive, bills for 100 and 150 kw. hrs. were not computed.

In interpreting these data, the reader is cautioned not to regard these figures as representing the utilities' cost of serving residential customers. The bills do reflect the cost to the consumer in the sense of what he pays for electricity. But the cost to the utilities involved may be more or less than the averages shown. To determine costs to the utility of serving one class of customer involves elaborate cost studies including many more or less arbitrary allocations. Moreover, the material in this article should not be interpreted as passing judgment on the reasonableness or unreasonableness of the bills.

The Graphic Picture

Table I, showing the average computed bills for the selected consumptions and the high and low bills in each size-group of community, is self-explanatory. The data in this table form the basis for the charts which follow. Any one who wishes to do some simple arithmetic may, by dividing consumption into bill, determine what the average rates are at different levels of consumption.

Chart I pictures the general decline

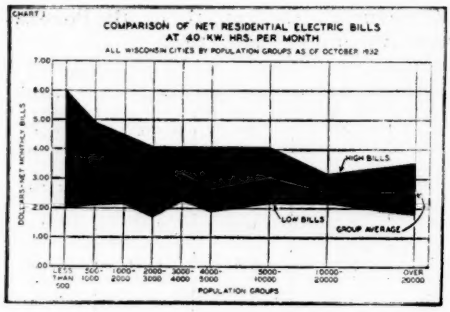
TABLE I. SUMMARY OF COMPARISON OF NET RESIDENTIAL ELECTRIC BILLS, BY POPULATION GROUPS, WISCONSIN CITIES, AS OF OCTOBER, 1932

Communities Classified by Size Groups	Total Net Bill for Following Use in Kw. Hrs. per Month				
	20	40	60	100	150
All Incorporated Communities in Wisconsin					
High bill	$3.00	$6.00	$8.80	$11.10	$14.10
Low bill	1.00	1.70	2.10	2.90	3.90
Average bill—All (500) communities	1.65	2.78	3.53	4.73	6.13
Cities over 20,000 Population					
High bill	2.00	3.52	4.44	5.64	7.14
Low bill	1.00	1.80	2.32	3.00	4.00
Average bill—All (18) cities	1.54	2.57	3.27	4.47	5.86
Cities 10,000–20,000 Population					
High bill	1.80	3.28	4.18	5.32	6.75
Low bill	1.40	2.19	2.79	4.01	5.33
Average bill—All (9) cities	1.54	2.55	3.23	4.41	5.69
Cities 5,000–10,000 Population					
High bill	2.20	4.08	5.16	6.36	7.86
Low bill	1.14	2.19	2.79	3.65	4.65
Average bill—All (20) cities	1.73	2.98	3.75	4.98	6.36
Cities 4,000–5,000 Population					
High bill	2.20	4.08	5.16	6.36	7.86
Low bill	1.15	1.90	2.38	3.08	3.96
Average bill—All (11) cities	1.59	2.61	3.26	4.31	5.66
Cities 3,000–4,000 Population					
High bill	2.20	4.08	5.70	6.36	7.86
Low bill	1.35	2.29	2.86	4.00	5.43
Average bill—All (15) cities	1.80	3.19	4.08	5.23	6.63
Cities 2,000–3,000 Population					
High bill	2.52	4.08	5.80	6.50	7.95
Low bill	1.00	1.70	2.10	2.90	3.90
Average bill—All (29) cities	1.78	3.08	4.02	5.16	6.56
Cities 1,000–2,000 Population					
High bill	2.47	4.48	6.00	7.40	9.90
Low bill	1.40	2.16	2.76	3.85	4.85
Average bill—All (68) cities	1.95	3.36	4.28	5.54	7.06
Incorporated Villages 500–1,000 Population					
High bill	2.70	4.90	6.90	7.70	9.90
Low bill	1.50	2.10	2.70	3.90	5.40
Average bill—All (139) cities	2.08	3.59	4.51	5.75*	7.30*
Incorporated Villages less than 500 Population					
High bill	3.00	6.00	8.80	11.10	14.10
Low bill	1.00	2.00	2.99	3.50	4.75
Average bill—All (191) cities	2.16	3.77	4.73	5.91†	7.45†

* Average of 138 villages.
† Average of 188 villages.

in the average, high, and low bills for 40 kw. hrs. as the size of the community increases. We have come to expect electric rates in the larger communities to be lower than those in villages and hamlets, and here we find a quantitative measure of this difference. In Wisconsin the average bill for 40 kw. hrs. in cities of 10,000 population or more is about ⅓ or $1.20 less than in a hamlet of less than 500 persons.

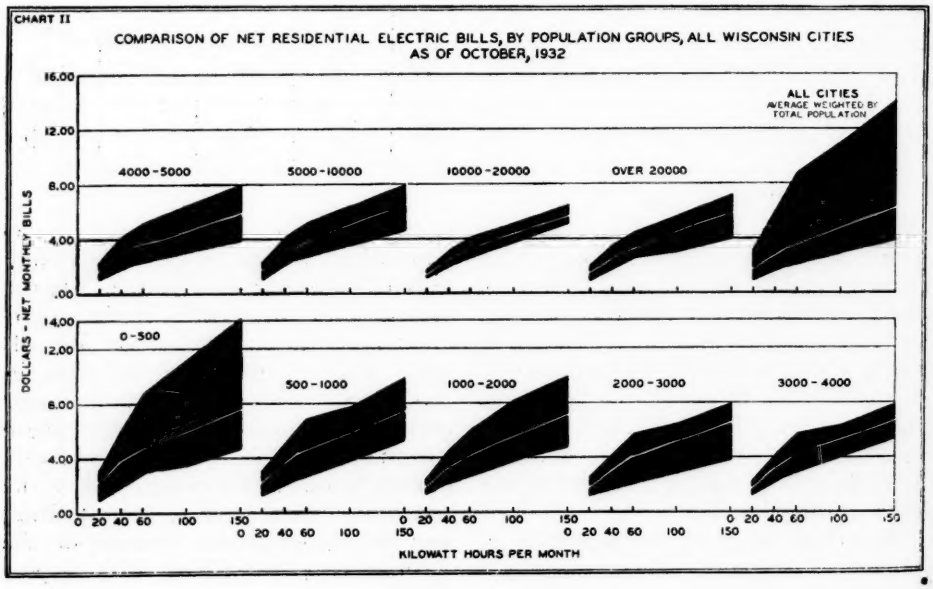
But there are some irregularities deserving of comment. The average bills in the 3,000–4,000 and 5,000–10,000 population groups appear relatively higher than might be expected. On the contrary, the average bill in the 4,000–5,000 group appears relatively low, almost reaching the level of rates in the 10,000–20,000 and 20,000-and-over groups. To explain adequately these irregularities would require examination of such factors as the rate policies of the companies serving these communities, and the geographical location of the communities, particularly with respect



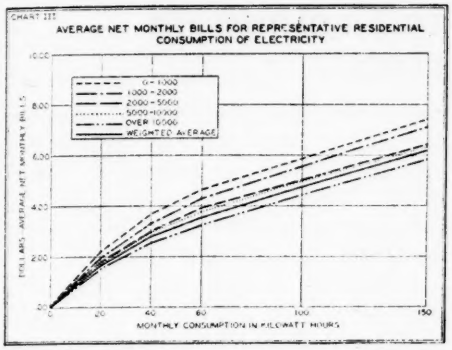
to water powers and distance from densely populated areas and the larger sources of supply. It is also noteworthy that the average bills in the two largest size-groups are virtually the same and that the spread between high and low bill in the 10,000–20,000 group is relatively narrow. The city with the lowest bill for 40 kw. hrs. has a population between 2,000 and 3,000.

Chart II shows the high, low, and average bills for each consumption in the various size-groups of cities and for all cities. Except for the extremely wide spread between high and low bills in the smallest communities, it might be said that a considerable degree of uniformity in bills had been attained in communities above 500 in population. The less-than-500 group has the largest number of communities, but the aggregate population therein is small relative to the remainder of the State, especially the over-20,000 group. It is noticeable that in general the spread between high and low bills decreases, i. e., the degree of uniformity increases, as the size of the community increases. The relatively high degree of uniformity in rates in cities of 10,000 to 20,000 population stands out.

Since very high or very low bills in one city may distort the picture of uniformity on Chart II, a different method has been used for Chart III, which shows only the average bills. In order to make the chart more readable, certain size-groups of cities have been combined, as noted on the chart. One striking feature of this chart is the narrowness of the spread between average bills in the

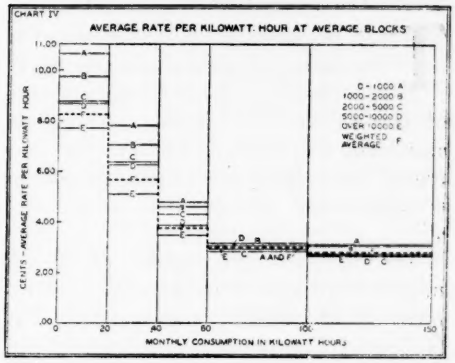


various sizes of communities. Especially noteworthy is the fact that after 40 kw. hrs. the lines run very closely parallel.



To those who are accustomed to rate curves of this type, this will indicate that rate differentials among communities of different sizes are largely established in the first 20 or 40 kw. hrs. and that the idea of promotional rates has permeated rather widely throughout the State. The close reader of the chart will note that communities with populations of 10,000 and over enjoy lower promotional rates than the State average and that customers using more than 60 kw. hrs. in cities of 2,000 to 5,000 population and those using more than 100 kw. hrs. in the 5,000–10,000 group of cities enjoy rates somewhat more promotional than the average in the State. As might be expected, those living in communities of less than 2,000 population receive the least promotional rates.

Chart IV translates the curves on Chart III into average rates per kw. hr. for the various blocks and accentuates two features of the earlier chart. With much more clearness, Chart IV shows that rate differentials among communities of different sizes are largely established in the first two blocks or, more accurately, in the first 40 kw. hrs. consumption. It also emphasizes the extent to which promotional rates have penetrated the State, especially in communities above 2,000 population. Even



in small towns, villages, and hamlets, the *average* rate per kw. hr., when consumption exceeds 60 kw. hrs. per month, approaches close to 3 cents. Except for the 60–100 kw. hrs. consumption block, the average rate per kw. hr. in each block is uniformly less as the size of the community increases. In this one block, residential users in communities of 2,000 to 5,000 population appear to enjoy the lowest average rate per kw. hr.

Conclusion

The value of such a study as this lies in the fact that it is a guide to further analysis of the rates of particular utilities, especially where they diverge from the average. Such further analysis is essential before adequate explanation of these differences can be offered and before final judgment should be passed on their justification.

The Organization and Personnel of the Nebraska Railway Commission

By L. L. DURISCH

The Administrative Agency

THE responsibilities involved in the regulation of public utilities make it desirable to place the organization of the Commission upon the highest standards of public administration. In regard to some of these standards there is substantial agreement; others are still matters of controversy.

The matter of the position of the administrative agency in the state government is of present importance. The Nebraska Commission is relatively free from executive control, and is touched by the Legislature and by the voters only periodically. The judicial system exercises the only constant control over the commission.

The movement for the reorganization of state government, starting in Illinois in 1917, has been forced to face the problem of whether the principles of reorganization shall be applied to public utility commissions. When Nebraska reorganized her administration in 1919, the State Railway Commission was left as an independent agency, although many boards and commissions were replaced by departments under single-headed control. Even states such as Illinois and Ohio, which went farther in the direction of consolidation, have left their Commissions free from active control by the executive. Washington has centralized control in a department, headed by a director assisted by supervisors. When acting in a quasi-judicial capacity, the signatures of two of this departmental board are necessary.

Oregon has recently gone the entire way and created a department of public utilities consisting of a single commissioner, appointed by and removable at the discretion of the Governor.[1] There is no agitation for a similar organization in Nebraska, either from the critics or defenders of the present system, perhaps because it is impossible to predict the type of governor Nebraska will elect. Governors have ranged in opinion from the most conservative to advocates of a wide extension of public ownership. Neither group in the State at present would care to put utility control directly under the Governor.

The advantages of a single-headed agency lie in the fact that a well-trained, experienced individual might easily be more efficient than any group or commission. The disadvantages are that continuity of policy is less likely and that many believe quasi-judicial and quasi-legislative functions to be better performed by a group than by an individual.[2] At present it seems likely that the Nebraska Commission will continue

[1] See Paul V. Betters, "The Case For and Against the One-Man Utility Commission," 8 *Public Utilities Fortnightly* 208-18 (1931).

[2] See Leonard D. White, *Introduction to the Study of Public Administration* (New York: Macmillan Co., 1926), p. 60; W. F. Willoughby, *Principles of Public Administration* (Baltimore: Johns Hopkins Press, 1927), p. 120; Walter F. Dodd, *State Government* (New York: Century Co., 1928), p. 256; but cf. Betters (*op. cit.*, p. 288), who, emphasizing the administrative aspect of regulation, states: "There is an unmistakable trend among students of government structure and functioning for abolition of the almost universal system of Commission regulation of public utilities and the substitution thereof [therefore] of a single-headed regulatory agency."

as an independent agency free from executive control for some time to come.

Requirements and Qualifications for Membership

The railway commissioners of Nebraska are constitutional officers, but their qualifications are established by statute, the Constitution merely providing that the three members shall be chosen at the general election.[3] Statutory requirements have been set up, but they are few and simple. Members of the Commission must be resident citizens of the State and qualified voters. They must not be less than 30 years of age, or in any way or manner pecuniarily interested in any of the corporations subject to Commission regulation. Should any commissioner obtain such an interest while serving on the Commission, he must at once resign.[4] Unlike some of the other states, Nebraska has no requirement of technical knowledge or experience.

Nebraska is one of the group of midwestern and southern states which have established elective commissions. The term of office is six years, which in comparison to the other state offices is relatively long. A continuing commission is secured by having one member elected every two years. In spite of untimely resignations, there has always been at least one experienced member on the Commission and, with the exceptions of the years 1919 and 1927, there have always been two incumbents with four or more years' service, each time a new member entered upon his duties.

No serious attempts have been made to have the commissioners appointive instead of elective officers, although most authorities seem to prefer the former method of securing public service commissioners. Probably many elected commissioners are supersensitive to the demands of uninformed voters, but the charge is also made that appointive commissions tend to grow aloof and become more responsive to demands from the companies than considerate of public interests.[5] It is thus impossible to say that either method would work the better under all circumstances.

The Nebraska commissioners are not subject to removal by administrative act, nor is there a provision for removal by recall. They are removable, however, by impeachment,[6] or a proceeding may be brought by the attorney general to declare the office vacant or forfeited if an incumbent shall have become a stockholder in a utility company, moved from the State, or disqualified himself as an elector. In 1918 an action in the nature of a quo warranto was brought in the Supreme Court of the State to oust the Railway Commissioners for failure to give an official bond. It was admitted that no bond was given, but the Court decided that the provisions requiring bonds for certain state officers did not apply to members of the Commission. The Legislature could not require bonds of constitutional officers.[7]

With but one exception the men who have served on the Commission have had university training, the great majority being university graduates. Most of the Commissioners had attained a limited degree of political prominence before their election to the regulatory body, but it is significant that none had held an

[3] Constitution, Art. IV, § 20.

[4] Session Laws of 1907, p. 312.

[5] Morris Llewellyn Cooke, *Public Utility Regulation* (New York: Roland Press, 1924), p. 195.

[6] The unique Nebraska procedure provides for the voting of the impeachment charges by a joint session of the House of Representatives and the Senate, and a trial before the Supreme Court of the State. (Constitution, Art. III, § 17.)

[7] *State of Nebraska ex rel. Shields v. Hall*, 170 N. W. 173 (1918).

important state executive office prior to their service on the Commission.

The membership of the Commission has been dominated by lawyers and newspaper men. This is probably because both classes have the political influence necessary to gain election. Lawyers have at all periods in our history shown much versatility, partly because of their experience in weighing evidence and in familiarizing themselves quickly with problems presented to them.

Bankers are also not out of place on regulatory bodies, and several have served on the Nebraska Commission. Engineers possess technical knowledge that would be of value to a commission,[8] but Nebraska has never had a commissioner with engineering training.

The lone physician who has served on the Nebraska Commission might seem to be not especially suited for such work. This particular commissioner was able to bring to the regulatory body long experience in public affairs, including distinguished service as the mayor of Lincoln. After all, the formal training of a commissioner is not as important as that he shall be intelligent, fair-minded, and anxious to perform the duties of his office to the best of his ability. With these qualifications a commissioner is able to rely on the staff for advice in technical matters.

Campaigns and Elections

The size of the Commission was fixed at three members, this number being the most common in the various state utility commissions. States with appointive commissions often require that the members shall not all be from the same political party. An examination of the party affiliations of members of the Nebraska Commission shows that the great majority have been Republicans. Nebraska has in the past been a Republican state under normal conditions and that party has been able to dominate the Railway Commission. Of the 16 men who have served on the Nebraska Railway Commission 12 have been Republicans. During the greater part of its history all three members have been elected by the Republican party. This situation has placed the Democratic party in the role of critic, and increases in the Democratic representation in the Legislature have at times threatened the existence of the Commission.

The party nominees are selected through the direct primary, a petition signed by 25 voters being sufficient to secure a place for the candidate on the primary ballot. The impression that bosses pick the candidates is widespread, but probably without much foundation. Rather, the primary gives the impression of being a wide open race, in which the most widely known, if not the best qualified, candidate wins.[9]

In general, the pre-election campaigns

[8] Francis X. Welch, 4 *Public Utilities Fortnightly* 803 (1929), has suggested that an ideal commission would be composed of one lawyer, one engineer, and one banker.

[9] Examination of the results of the primary elections shows that in most cases real contests for the nomination developed in both parties. Occasionally, an especially well known candidate or a candidate for re-election had an easy time in the primaries, but such cases are exceptional. The following is the result of the 1932 primary vote:

Republicans		*Democrats*	
Floyd Dort	13,497	Floyd L. Bolen	24,662
John H. Miller	12,270	K. C. Enudson	14,411
Orville H. Andrews	11,516	John H. Hutchins	12,491
Harry A. Foster	10,375	E. A. Walrath	11,822
George L. Jackson	9,419	Phil H. Kohl	11,295
George C. Porter	9,389	Harry K. Easton	9,748
Richard F. Wood	7,479	Irl D. Tolen	9,721
Henry F. Keiser	6,082	George Pierce	9,710
Ralph C. Lawrence	4,955	W. B. Eastham	8,091
James A. Little	4,915	T. O. Merchant	5,639
Cyrus B. Wall	3,356		
H. E. Glatfelder	2,889		

(*Official Report of the Nebraska State Canvassing Board*, Primary Election of 1932, pp. 6, 12.)

(*Footnote 9 continued on page 45*)

of candidates for the Commission have not attracted a great deal of attention. Political advertisements are run in the leading newspapers of the State, but the advertising is very reserved in character, consisting in most cases of a picture, a list of special qualifications, and some general statements characteristic of political advertisements, such as "Randall on the Commission is a pledge of a square deal for all"; "John E. Curtis—highly qualified for the position he seeks."[10] Occasionally a challenging note creeps into the advertising: "Floyd L. Bollen, candidate for Railway Commissioner. The Commission should serve the people or be abolished."[11] Another candidate promises " . . . if elected, to do all things possible to make the State Railway Commission responsible to the needs of the producers on the farm, the men who pay excessive freight, as well as to the railroads."[12] Still another candidate seeks favor by making vague threats against federal control of freight rates: "the Interstate Commerce Commission has assumed that they alone control intra as well as inter-state rates and that state Commissions are only advisory. So far they have made this stick. It is time to assert our state rights."[13]

A retiring commissioner has charged that unfair political speeches have done much to lower the prestige of the regulatory body in the eyes of the people. Candidates will tell the public of great rate reductions to come at an early date if they are elected. Regardless of the personnel of the regulatory body, such rosy promises are generally not carried out because they are impossible promises.[14] Public resentment, however, is often turned against the Commission, rather than against the candidate who resorts to political insincerity.

The Nebraska election law provides that candidates file statements of contributions and expenses incurred in the campaign. Corporations are prohibited by law from contributing to campaign funds. The reports filed with the state auditor show that candidates for the Railway Commission spend very small sums in their campaigns, never more than a few hundred dollars.

An election law, however, cannot prevent certain interests from quietly and unofficially working for one candidate and against another, and probably some such aid has been given. Testimony introduced at an investigation conducted by the Federal Trade Commission tended to show that certain electrical utility interests had contributed to the 1926 primary campaign fund of Thorne A. Browne, candidate for re-election to the Nebraska Commission.[15] Mr. Browne, in a statement published in the *Nebraska State Journal*, denied that he had received any such aid:

"If it is anybody's business in Washington, I will say that it is against the law in Nebraska for corporations to furnish contributions to candidates for office. The law requires that the candidate file a statement of contributions exceeding very small amounts,

(*Footnote 9 continued from page 44*)

Mr. John H. Miller, the retiring member of the Commission, was defeated for renomination. In regard to his candidacy, the *Nebraska State Journal* stated: "Mr. Miller's election was influenced by support of the Klan, it was alleged at the time of his nomination over Thorne Browne. His name was also said to have been confused with that of John E. Miller, prominent merchant who has received an award from his fellow citizens of Lincoln for distinguished service. John H. Miller has never received an award for distinguished service. A lot of candidates hope to win over him at the next primary." (December 25, 1931.)

[10] *Nebraska State Journal* (Lincoln), October 31, 1928.

[11] *Ibid.*, November 3, 1924.

[12] *Ibid.*, October 29, 1928.

[13] *Ibid.*, February 17, 1932.

[14] Statement of Thorne A. Browne, *Nebraska State Journal* (Lincoln), August 26, 1926.

[15] Associated Press Report in *Nebraska State Journal* (Lincoln), January 24, 1929.

and also a statement of expenditures. My statement is on file . . . I fought that campaign out almost alone and lost. I failed even to interest my friends in the seriousness of that conflict. If the utilities spent any money in my behalf, it was not well expended."[16]

The matter was dropped without any further investigation, but the incident was unfortunate in its effect upon the prestige of the Commission.

During a recent campaign a candidate seized upon the resignation of commissioners to enter the employment of private corporations as campaign material. A pledge not to enter the employment of any corporation subject to the regulation of the Commission was widely published. The pledge made excellent campaign material of the more sensational sort, but could hardly be said to have increased public regard for the Commission upon which the candidate later served.

The examples given are probably not typical, for in the main the candidates have conducted their campaigns in a quiet, dignified manner. Nebraska, however, has not been entirely free from campaign demagogism, the chief result of which has been to lower the prestige of the regulatory body in the eyes of the people of the State.

Length of Service

At least the first year of the six-year term is required for a newly elected commissioner to familiarize himself with the duties of his office. It is reasonable to suppose that the question of re-election handicaps his work during the last year of the term, thus leaving but four years for effective work. If the commissioner is re-elected, the period of effective work is increased in the second term.

Re-election of capable commissioners is common, and with one or two outstanding exceptions deserving commissioners have been retained by the voters as long as they desired to serve on the regulatory body. Re-election has occurred six times in the history of the commission. While the average tenure is only five years, chiefly because of deaths and resignations, there are a number of instances of long service. One commissioner served continuously for over 15 years, while four others served for over eight years each.[17]

The Commission has, however, lost heavily from resignations. Five commissioners have resigned during their term of office, and the matter of resignations presents a much more serious problem than the failure to re-elect worthy members. Resignations are partly attributable to salary considerations, although the $5,000 paid to the commissioners compares favorably with the salaries paid to other state officials, and also compares favorably with the salaries paid by other states to members of their regulatory commissions. Capable men are able to secure more lucrative positions in private employment and so leave public service.

This constant loss of capable commissioners at the time when they become most useful in public service also extends to the loss of staff members. The effect on the efficiency of the organization is apparent, but the weaning away of commissioners and employees has a more sinister effect; it serves to break down public confidence in the regulatory

[16] January 26, 1929.

[17] Mr. Morris Llewellyn Cooke's conclusion that the tenure of the elective commissioner is more secure than that of the appointive commissioner (*op. cit.*, p. 194) was doubtless a surprise to advocates of appointive commissions. A study of the length of service of appointive utility commissioners in Massachusetts made by Mr. E. W. Morehouse, 5 *Journal of Land & Public Utility Economics* 323 (1929), shows, however, that incumbents served on the average 7.0 years each, a tenure of office two years longer than the average number of years served by members of the Nebraska Commission.

body and to undermine popular belief in the integrity of the regulating mechanism.

In 1918 Mr. Victor E. Wilson resigned from the Commission in order to reengage in the practice of law. Soon after resigning Mr. Wilson appeared in several important cases in which the Commission was involved. In some quarters it was contended that he was making an unfair use of knowledge, experience, and prestige gained while a member of the regulating body.

Three of the five resigning commissioners have left to enter the direct employment of utility companies. Mr. H. G. Taylor, after long and distinguished service on the Commission, was suggested for appointment to the Interstate Commerce Commission. President Coolidge indicated willingness to make the appointment, but in accordance with the rule of senatorial courtesy called the two Nebraska senators into conference. Both Senators Norris and Howell objected to the appointment;[18] certain statements favoring private ownership of utilities, made by Mr. Taylor while he was serving as President of the Association of Railway and Utility Commissioners, without doubt gave the clew to their objections. Denied this advancement, Mr. Taylor resigned from the Nebraska Commission to accept the position of manager of the Public Relations Section of the American Railway Association.

The next loss to the private utilities was the resignation of Mr. Thorne Browne, who had been connected with the Commission as secretary and commissioner for over 10 years. Mr. Browne, one of the most able men ever to serve on the Commission, had been defeated for renomination at the primaries, and resigned without finishing his term. After the lapse of a few months Mr. Browne became the director of the midwest division of the National Electric Light Association.

The latest resignation to enter the private utility field was that of Mr. John Curtis, who left the Nebraska Commission to become associated with the Nebraska-Iowa Power Company. Mr. Curtis filed for re-election, but later withdrew his name and resigned from the Commission. Upon his retirement he observed:

"The Commission is a political graveyard . . . The almost invariable rule with the Nebraska Commission has been that a member's services are dispensed with after a few years with practically no other market left for his trained services except the public utilities. When he enters this field those who are mainly responsible for his change of employers proclaim it as proof of his friendship while in office with the public service corporations. I have had enough."[19]

The situation was discussed in an editorial in the *Omaha World Herald* under the caption, "The People Lose":

"Resignation of Chairman John Curtis from the Nebraska State Railway Commission, to accept a position with a power company was not a surprise for it has long been forecast, although at first denied. His departure calls striking attention to the fact that the public is training men, in the Rail Commission, for more lucrative posts with the large utilities, for before Mr. Curtis went Thorne Browne, and before Thorne Browne went H. G. Taylor. No one, perhaps, would insist that these gentlemen refuse flattering offers from private corporations, because they have been in public service. The rewards of public office are not great, and one is subject to the temperamental fickleness of the voters, who do not always reward good service with re-election. But the procession of Rail Commission members to utility posts marks the passing of

[18] H. T. Dobbins, "Regulation by Intimidation of Commissioners," 7 *Public Utilities Fortnightly* 230 (1931).

[19] Quoted by Dobbins, *op. cit.*, p. 229.

the vigor and influence of the rail body, which was originally set up as a safeguard to the people in their clashes with powerful private interests, and has become in recent years a yes-group to utility desires. One's faith in Commissions wanes as the years go on . . .

"The fact that one after another of the able men of the Nebraska State Railway Commission have found highly lucrative posts in the field of privately owned utilities is not conducive to effective work for the public interests by future members. The most able among them will realize that their career in public service, in politics, is a difficult path, beset by many pitfalls. They will perceive that in this day and age the private corporations can pay the high salaries, and can reward with steady promotions, with increasing responsibility its efficient employees. They will have daily contact with the important executives of these private companies and will be given an opportunity of demonstrating their capacity for business leadership. It is a natural tendency, without a shadow of intentional betrayal of public trust, inevitable for both the public official and the private company that makes the value of state regulatory bodies seem doubtful. No one has suggested a remedy, but a remedy must be found, lest the last shred of public safeguard under the present system be lost."[20]

It is easy to see that there is a real need for a more professional spirit in the regulatory bodies. Public utility regulation needs "career men"—young men of ability, training, and character who will devote their lives to the administration of the relationship of government to public utility service—rather than men who have little interest in the office except as a reward for political services, as a stepping stone to a higher political status, or as a way to a position with a private utility company.[21]

The State of Wisconsin, by the appointment of Mr. David E. Lilienthal of Chicago to a position on its regulatory body, has set a valuable precedent. The spirit of localism was overcome; Mr. Lilienthal's effective work in the field of regulation was recognized; and Wisconsin secured an outstanding commissioner by the appointment. A system by which it could be possible for an able commissioner to secure advancement to the regulatory body of a larger state, and thus remain in public service, might help to solve the problem of resignations to enter private utility service. Unfortunately, much public opinion and many state laws will have to be changed before states like Nebraska can follow the example set by Wisconsin.

Staff Organization and Expenditures

The Nebraska Commissioners annually elect one of their members as chairman. His duties are to preside at meetings of the Commission and at hearings held before it. The chairmanship changes from time to time, usually being held by a member for no more than two consecutive years. The chairman has no special powers and control of the employees of the Commission is vested in the Commission as a whole, rather than in individuals.

The law organizing the Commission provided for a secretary, to be appointed by the Commissioners for no specific term of office, and whose qualifications were to be the same as those of the Commissioners.[22] The salary for the office is $2,640 per year. Since the establishment of the office of secretary eight persons have held the post—an average tenure of slightly over three years. In the main, the secretary is merely a routine officer, but in some cases he has been able to exercise considerable initiative and discretion, for example, in the settling of informal complaints. The functioning of the office depends to a great

[20] August 18, 1930.

[21] William L. Ransom, *Realism in Regulation* (Chicago, 1932), p. 2. (Address, privately printed.)

[22] Session Laws of 1907, p. 313.

extent upon the personality of the secretary and his relations with the Commissioners. Under the more vigorous holders the office has approached the status of an executive secretaryship, thus leaving the Commissioners more free to devote themselves to other aspects of their work. A secretary, while filling his office, gains valuable knowledge of the work of regulation, and it is natural that the Governor select able secretaries to fill vacancies that occur on the Commission.[23]

In addition to the secretary, the original staff organization consisted of only two clerks. The present staff has 19 members. The most important of these employees is the rate expert. Long tenure of office is especially desirable in the case of this officer, since the nature of his duties requires that he be well trained in the technique of rate investigation and schedule compilation. The Nebraska Commission was fortunate in being able to retain the services of Mr. V. G. Powell from the time of the creation of the Commission in 1907 until Mr. Powell's death in 1930. Mr. Powell was succeeded by Mr. C. A. Ross, who had been Mr. Powell's assistant for many years. The salary paid to this officer is equal to that paid a commissioner, $5,000. In the present organization the rate department contains four other employees.

In accordance with an act passed by the Legislature of 1909, providing for the valuation of public service properties,[24] the Commission established a department of engineering. The importance of the work of this department is indicated by the fact that its head is paid $4,200, the second highest salary of the staff officers. The present head of the department, Mr. B. E. Forbes, has been with the Commission for over 18 years. There are two assistants in the department.

The accountant was first recognized as head of a division in 1924.[25] His qualifications must be those of an expert business accountant, as he is called upon to supervise the bookkeeping systems of a number of corporations subject to regulation. Mr. Lawrence W. Kemmer, the present head of the department, has served in various capacities with the Commission since 1919. He has two assistants and the present salary is $2,640.

A single individual who keeps records of the routes, rates, and bonded liability of bus transportation companies is known as the bus supervisor. Mr. R. E. Powell has been engaged in this work since 1926 at an annual salary of $1,800.

The legal services for the Commission are furnished by the attorney general's staff, one of the assistant attorney generals being designated as the Commission counsel. In addition to giving legal advice to the Commission, the assistant attorney general represents the Commission in cases tried before the courts and in hearings before the Interstate Commerce Commission. Mr. Hugh La Master has served in this capacity since 1917. Recent Commission reports have urged that, because of the pressure of business, the Commission be accorded Mr. La Master's full-time service. There is no evidence of conflicts arising between the attorney general and the Commission, although such conflicts might very easily develop and, if they did, the Commission would have additional reason for preferring its own legal department.

Below the heads of departments are a number of employees whose work

[23] On three different occasions, the Governor has selected the secretary to fill a vacancy on the Commission.

[24] Laws of 1909, p. 424.

[25] *Reports of State Railway Commission*, 1924, p. 6.

requires considerable skill and technical knowledge. The assistant secretary and reporter of the secretary's office, the rate clerk of the rate division, the examiner employed by the chief accountant, and the assistant engineer are in this classification. Their tenures of office are rather short because of low salaries and the opportunities offered in private employment. The salary range in this class of employees is from $1,800 to $2,640.

Below these expert employees is the usual office force of bookkeepers, clerks, and stenographers, numbering about eight in all. Recruitment is from the commercial field and changes are quite frequent. Salaries are low, ranging from 1,200 to $1,320 per year.[26]

The legislative appropriations have grown from $25,000 for the year the Commission was organized to about $60,000 a year for the past six years. Prior to 1921 the annual salary paid each Commissioner was $3,000. In 1931 the salary scale was raised to $5,000 and necessary travelling expenses.[27]

Nebraska is now spending on its regulatory body about 4¼ cents for each inhabitant. This was, during 1931, .009 of the total State taxes levied.[28] This sum, while not large, is about the average spent by the states on regulation.

The Commission in turn collects very little money, as under the law practically all its activities are without charge and free to any citizen of the State. A small charge is made for examining utility securities, and moneys so collected are turned over to the state treasurer to be credited to the general fund.

Under the Nebraska practice the budget of the Commission is submitted to the Legislature by the Governor. Since the Commissioners are not responsible to the Governor, they have felt free to take up their financial needs directly with the legislative committees and the Legislature has been very free in changing the Governor's estimates. A lump appropriation is made by the Legislature, the Commissioners retaining full control of the organization of the staff.

Publicity and Reports

The Commission is very particular to see that adequate publicity is given to its affairs. Each day the secretary gives to newspaper representatives a statement of the matters which have come before the Commission. In addition to this centralized publicity, the individual Commissioners often give statements for newspaper publication.

The Commissioners and staff issue annually a report of their activities, 24 volumes having been published to date. The results of the formal hearings are set out in full; informal hearings are merely noted by indicating the disposal of the case. The applications of the utilities companies are listed and the result of the request is recorded. Tables indicate the number of cases disposed of and pending on each of the three dockets.

In the main, the material covered by the *Reports* seems to be well arranged and presented. Very little of the reasoning of the Commission in particular cases is included. This is, of course, disappointing. Costs of publication probably account for the fact that the reports are not as complete and detailed as might be desired.

Conclusion

To perform the diverse tasks of regulation, the voters of Nebraska have elected Commissioners whose general

[26] Data on personnel and salaries from the *Annual Reports* of the Commission.

[27] Session Laws of 1921, p. 198.

[28] Statement of Railway Commissioner Drake, *Nebraska State Journal* (Lincoln), April 5, 1932.

qualifications have been good, but most of whom have had to familiarize themselves with utility affairs after taking office. The voters have shown a disposition to continue able Commissioners in office for fairly long periods. The Commissioners, on the other hand, have shown a marked tendency to give up the trials and uncertainties of public service for relatively secure employment with private utilities. This trend has caused many to doubt the value of continuing the Commission. The old formula of longer terms and higher salaries seems to be an inadequate remedy to offer, but that, plus the development of a professional spirit among those engaged in regulation, is about all that can be suggested as a means of keeping able men in the public service.

A larger, better trained and better paid staff will increase the opportunities for good service. Nebraska has had some outstanding experts on the staff of the Railway Commission, but they have been too few in number. The Nebraska Railway Commission is a continuing body, and this continuity is reflected in the stability of its staff organization. Wholesale turnovers have never taken place, and many of the technical employees have served a number of years. This is fortunate, for an able and experienced staff will do much to offset the Commissioners' lack of special training. Political or even personal considerations have not been permitted to disrupt the staff organization in spite of the lack of any formal guarantees against dismissals.

Cycles in Real Estate Activity: Los Angeles County

By LEWIS A. MAVERICK*

A STUDY of real estate activity, based upon data from Alameda and San Francisco Counties, California, has recently appeared in this *Journal*.[1] The method employed in the analysis is described in that article, but it may not be amiss to summarize it here and to set forth the point of view from which the investigations have been undertaken. The monthly or annual data, that is the counts of subdivision maps, or of deeds filed, are plotted on a time chart, and are subjected to successive smoothings. The smoothing lines serve to separate the minor from the major cycles of activity. The aim is to examine and describe the trend and the major cycles; extended description of the minor cycles has been omitted because these movements are slight and because no significant regularity has been found in the shorter movements.

During the summer of 1932 the records of Los Angeles County, California, were examined, to determine the extent to which real estate activity in the southern city corresponds to that in the northern area.

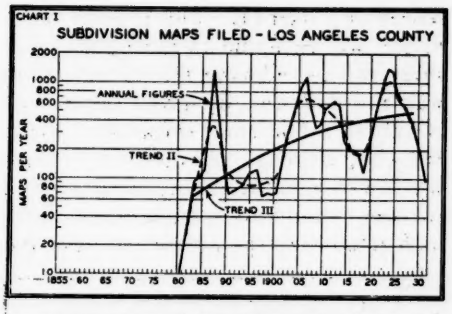
Subdividing Activity

The analysis of subdivisions in Los Angeles County was made on a simpler plan than that of the former study, a count of maps having been substituted for the detailed count of lots. This count has been made by the County Recorder since 1880. Chart I presents the number of subdivision maps filed each year in Los Angeles County. The count includes those maps which vacate former subdivisions and record a reversion of platted land to acreage. Properly, maps of this type do not represent subdivisions and should be subtracted from the count, but it was not found practicable to eliminate them, and this omission has not been regarded as serious, since such reversions are relatively few. This feature tends to make the count of maps too high faithfully to represent subdivision activity in periods of depression. A second fact causing the same type of error is that the average number of lots on each map tends to vary moderately with the cycle, small subdivisions being relatively more frequent during depression. Consequently, the conclusion is warranted that subdivision activity in Los Angeles County has been characterized by even more violent fluctuations than Chart I indicates.

Peaks in Los Angeles County activity are found in 1887, 1906, and 1923, suggesting a cycle approximately 18 years in length. The northern study showed a later date for each of these peaks, and suggested a 15- or 16-year cycle, though the estimate of the shorter period was based in part upon happenings prior to 1880. If the peak of the early activity were considered to occur in 1870 rather than later in that cycle, the length of the periods in subdivision activity in the northern section of the State would have been found more nearly in agreement with the 18-year period observed for Los Angeles County. The trend line for Los Angeles County

* The author wishes to acknowledge the assistance of Mr. George W. Leibacher in this study.

[1] Lewis A. Maverick, "Cycles in Real Estate Activity," Vol. VIII, No. 2, pp. 191-199 (May, 1932).



For comparison with Alameda County and East Bay Urban Area, see Charts I and II, former article, *supra* n. 1.

rises more steeply than that for Alameda County, and in recent years it shows a tendency to flatten, whereas for Alameda County the curve turns rather definitely downward after 1913.

Historical Background

In 1868 Southern California was emerging from a long depression; banks had been established in Los Angeles; large *ranchos* were being divided into farms; and heavy immigration was taking place. Railroad building was under way: in 1869 the line to the local port of San Pedro was finished and in 1876 the line to San Francisco, which connected with the transcontinental railway; in 1881 the Southern Pacific was opened to New Orleans; and in 1885 the Santa Fe was completed.

In 1871 there was a drought which did great damage to live stock and turned attention to agriculture. This occurred again in 1877. In the middle 70's the navel orange was introduced, though control of the pest which attacked oranges was not established until 1889. The national panic of 1873 did not strike California until 1875, but the succeeding six years saw dullness and inactivity in Southern California.

The 80's were marked by activity all over the country, but this was heightened in Southern California; the railroads entered upon a rate war in 1885, bringing homesteaders to California at ridiculously low rates. Many subdivisions were developed to tempt the newcomers. Professional boosters and promoters arrived and laid out subdivisions in such quantities and in such unfavorable locations that many of them have not yet been occupied in 1933. This was the setting for the sharp peak of activity in 1887. The value of the instruments (deeds, mortgages, etc.) filed with the County Recorder of Los Angeles County in 1887 amounted to $100,000,000. In addition, many sales contracts were never completed to the point of record as deeds. It has been estimated that another $100,000,000 would be required to cover them. The promptness of the collapse indicates the inadequacy of the base for this expansion.

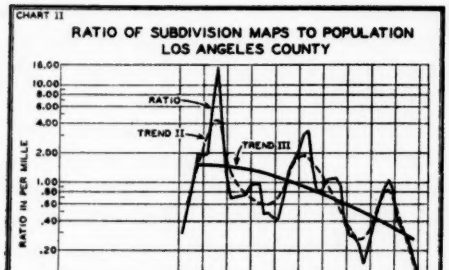
The depression of the 90's was interrupted by a minor upward movement which quickly subsided. There was an important drought in 1894, followed by a longer one in the years 1898-99-1900, but by the end of this time recovery was apparent. The year 1901 showed tangible recovery in real estate activity, which culminated in the peak of 1906. In April of that year occurred the San Francisco earthquake and fire and in 1907 the national panic.

In 1901 the irrigation canal was built from the Colorado River to Imperial Valley; in 1908-13, the aqueduct bringing to Los Angeles the waters of the Owens River. In 1915 the Panama Canal was opened. In 1920 and following, important oil discoveries were made in and near Los Angeles County. This development raised the status of the port from insignificance to a place among the great ports of the country. Following the World War there was heavy immigration to Southern California from the Middle West. The years 1923-24-25

were marked by a drought, and 1925 by the hoof and mouth disease. This brief chronology may help to explain the movements of the curves of subdivision activity.

Deflation of the Primary Indexes of Activity

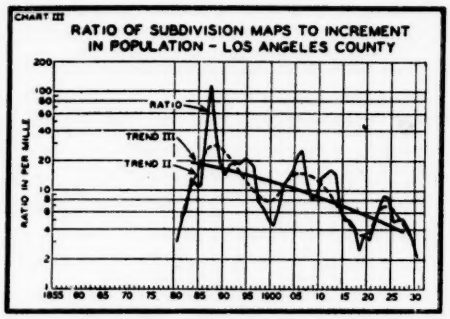
The fluctuations on Chart I have been found to be violent. Will greater stability be discovered, if the count of subdivisions is divided by the population, thus reducing the figure to subdivisions per thousand of the population? This ratio has been plotted on Chart II, but the anticipated reduction in the violence of the fluctuations does not occur.



For comparison with Alameda County, see Chart IV, former article, *supra* n. 1.

The distinct change effected is in the direction of the trend line. Subdivisions are increasing in absolute number, but decreasing in relative number per thousand of resident population. Chart II shows about the same rate of decline for Los Angeles County as was found in the similar chart for Alameda County.

Since it has been found that reducing the figures to a per capita basis does not reduce the fluctuations, it may be inquired whether subdivisions vary in number with the number of new settlers. To answer this question, the count of subdivisions has been divided by the population increment, and this ratio presented on Chart III. This process of deflation will be found to have been more successful in reducing fluctuations than was the deflation by gross population (Chart II). This chart shows also that in the 90's, although subdivision activity was low in absolute count, still in view of the very small immigration it was fairly high relative to the number of newcomers. Some such effect is apparent also in the years 1911 to 1913. It may be tentatively concluded that, after a major peak in subdivision activity, the subdividers are willing to resume activity long before the interrupted settlement by new residents is resumed. When compared with the northern study, this chart reveals a steeper downward trend in Los Angeles County, and a more definite reduction in the amplitude of the swings. In Alameda County the fluctuations in subdividing were great even though immigration there proceeded at a constant rate.

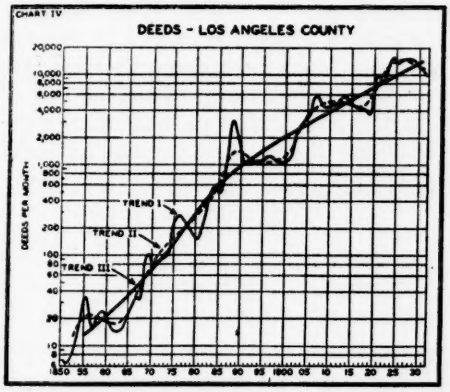


For comparison with Alameda County, see Chart V, former article, *supra* n. 1.

Deeds

The counting of deeds was accomplished in Los Angeles County in the same fashion as in Alameda County. For the early years the individual deeds were distributed from the index books according to the month of execution, and the aggregate determined for each month. For more recent years the count was

taken from a secondary source, the daily "reports" which were sold currently to title insurance and real estate firms.[2] The earlier series, known to contain some duplication, was then adjusted to make it continuous with the more recent figures. Chart IV presents the continuous series for Los Angeles County. The feature of this chart is the astounding rate of growth from 15 deeds per month in 1855 to 12,000 in 1926. The deviations from trend are small, more nearly comparable with Alameda County than with San Francisco. The peak of 1887 stands out on the Los Angeles chart as contrasted with the two northern areas. In the recovery of 1901 Los Angeles resembles San Francisco, whereas in Alameda County this movement was deferred to 1905. For the Los Angeles curve, the intervals between peaks are, roughly, 18 years, 13 years, 22 years, and 17 years.



For comparison with San Francisco and Alameda County, see Charts VI and VII, former article, *supra* n. 1.

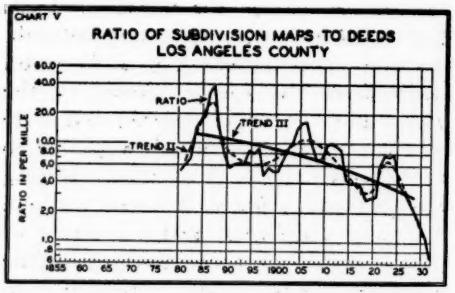
Early History

The discussion of the count of maps already given has included some items from the history of Los Angeles which seem to throw light on the activity in real estate. Since the record of deeds begins earlier than the count of subdivisions, it is necessary to add certain items from the earlier history of the *pueblo* and city. It is reported that there was a boom in 1835, which would be 20 years before the peak of 1855. During the gold rush, a few strikes were made in Southern California, and a number of prospectors, even those destined for the northern fields, passed through Los Angeles. It has been estimated that 25,000 from Sonora alone passed through Los Angeles each year for three years. In 1849 the new American authorities conducted a land survey in Los Angeles, and instituted American practices in land holding and in transfers. During the 50's "squatting" or pre-emption caused much litigation but in the end accomplished a substantial transfer of real estate. Following the gold rush, all California felt the slump of the 50's, with the readjustment from prospecting and mining to agriculture and stock raising; in 1855 bank failures occurred in San Francisco; in 1857 a drought. In 1858 the first regular transportation system, the Butterfield Stage, began the run from Los Angeles to the East. During the Civil War California used gold money and a number of local industries were established; but the 60's, on the whole, were marked by depression.

Relationship Between Series

Chart V compares the two measures of activity in real estate—namely, subdivisions and deeds. The slope of the trend line on Chart V is not greatly different from the slope on Charts II and III. Deflating the subdivision series in any one of the three ways seems to give the same long-range result.

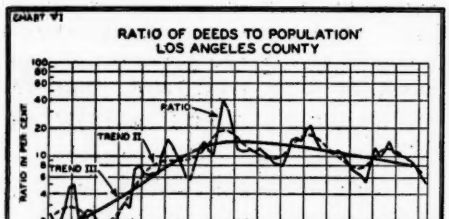
[2] The curve does not include the deeds registered under the Torrens system of land registration. Since 1915, when this system was inaugurated, the number of deeds so registered has increased to 3% of the total.



For comparison with Alameda County, see Chart IX, former article, *supra* n. 1.

Deflation of the Count of Deeds

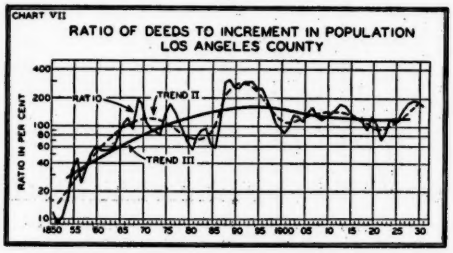
Chart VI presents the ratio of deeds to population. In San Francisco the trend line sloped downward from 1870 to about 1895, and since that date has been gently rising. A similar situation is found in Alameda County, but the rise after 1895 is even more gentle than the rise in San Francisco. In Los Angeles County, on the other hand, the trend rose sharply from 1850 to 1890 and since that date has been falling moderately. Perhaps it is merely a coincidence that the peak in the Los Angeles curve coincides with the low points in the two northern curves, but



For comparison with San Francisco and Alameda County, see Charts X and XI, former article, *supra* n. 1.

there may be a causal relationship—namely, that activity in the one community was to some degree at the expense of the other. From the present slope of the trend line and from the evidence of the older community to the north, it may be expected that the figure of eight deeds per 100 persons per year in Los Angeles will fall to a figure nearer five or six, and will remain reasonably stable in that proportion.

Chart VII presents the ratio of deeds to increment in population. Because the growth of population in Los Angeles has been following a compound interest trend line, the trends of the curves of population and of population increment (not here shown) are parallel on loga-



For comparison with Alameda County, see Chart XII, former article, *supra* n. 1.

rithmic paper. As a consequence, the trend lines on Charts VI and VII are remarkably similar, although the details of the fluctuations are different. Through the 90's there was activity in real estate transfers without heavy immigration. The peak of 1906-13 is reduced on Chart VII because the activity in deeds was accompanied by heavy immigration. Charts VI and VII will warrant extended study in comparison with Chart IV.

Conclusion

On the whole, this study has confirmed the findings of the earlier study. The cycles discovered for Los Angeles County, although they differ in detail, are in the broader outlines similar to those found in San Francisco and Alameda Counties.

Expense and Capital Ratios of Wisconsin Electric, Gas, Telephone, and Water Utilities, 1927-1931

By BARCLAY J. SICKLER

THE five years from 1927 to 1931 have witnessed a break in the rapidly ascending "long-time" trend of utility revenue, and the beginnings of a reversal of trend. All indications are that the downward movement which began in 1931 has continued at an accelerated pace in 1932, but it is yet too early to know the exact amount of this decline or its effects on 1932 operations. In view of the rapid developments during 1932, data for 1931 are almost ancient history. However, this history should be both interesting and valuable in itself and as a background from which to view 1932 results when these become known. The figures for the five years ending with 1931 are presented now because some time will elapse before full 1932 data can be compiled and analyzed.

This article is concerned primarily with the effect of the change in the trend of utility revenue on operating and capital ratios. This change in revenue trends came almost unheralded, and many utility executives were as much surprised by it as was the public in general. It will be interesting to observe how the utilities were able to meet this situation.

The basic data for computing the ratios studied are contained in Table I. These data were obtained by tabulating the annual reports which all Wisconsin public utilities make to the Wisconsin Public Service Commission. The figures cover operations in Wisconsin only. Certain explanations regarding the data are contained in footnotes attached to Table I.

Operating Expense Ratios

The ratio of operating expenses[1] to total operating revenue is one of the most commonly used measures of operating efficiency. Its trend, as well as its actual size, reveals how an industry is able to adjust expenses to revenue. Many factors influence it, of which the most important, perhaps, are the relative amounts of fixed capital employed. The following summary compares this ratio by years and by utility services:

	Ratio of Operating Expenses to Operating Revenue				
	1927	1928	1929	1930	1931
Electric utility...	42.1%	40.9%	40.5%	40.4%	39.0%
Gas utility.....	50.6	50.4	49.9	48.6	46.9
Telephone utility.	57.1	55.8	56.3	60.1	57.4
Water utility....	40.8	41.4	39.7	40.3	39.8

The progressive decline of the operating ratio in the electric and gas utilities is striking. In the electric utility the ratio declined from 42% in 1927 to 39% in 1931, and in the gas utility from 50½% to 47% in the same period. This decline was not interrupted by the depression year 1931, but was on the contrary accentuated. The decrease in operating ratios in these two utilities in 1931

[1] Operating expenses include such expenses as production, distribution, maintenance, traffic, commercial, and general. They exclude depreciation, taxes, interest, etc.

was almost as great as the total decrease in the preceding four years. The chief cause of the large decline in the operating ratio in 1931 was probably the pressure being placed on utility managements by security holders to preserve as much net income as possible. Operating expenses presented almost the only place where savings could be made. Other charges are largely fixed in character, and are subject only to a limited extent to managerial control. Savings in operating expenses were made easier by the decline of the general price level, which was much greater in degree than was the decline of utility revenues.

The trend of the operating ratio in the telephone and water utilities is not so apparent. In the telephone utility, this ratio declined in 1928, rose in 1929, and again rose sharply in 1930, a year of heavy maintenance expenses. In 1931 a sharp decline took place, but only to the 1927 level. This decline in 1931 is to a great extent explainable by the abnormal height reached in 1930. Variations in the water utility operating ratio can only be termed haphazard.

TABLE I. DATA ON OPERATING RESULTS AND FIXED CAPITAL, WISCONSIN ELECTRIC, GAS, TELEPHONE AND WATER UTILITIES,* 1927–1931, INCLUSIVE.

	1927	1928	1929	1930	1931
Total Operating Revenue					
Electric utilities†	$42,706,000	$46,310,000	$50,798,000	$52,129,000	$51,306,000
Gas utilities	12,462,000	13,405,000	14,436,000	14,702,000	14,235,000
Telephone utilities	19,658,000	20,834,000	22,301,000	22,740,000	22,275,000
Water utilities	7,481,000	7,728,000	8,254,000	8,522,000	8,539,000
Total Operating Expenses‡					
Electric utilities	18,000,000	18,960,000	20,573,000	21,062,000	20,002,000
Gas utilities	6,302,000	6,753,000	7,208,000	7,150,000	6,676,000
Telephone utilities	11,228,000	11,624,000	12,560,000	13,667,000	12,780,000
Water utilities	3,055,000	3,201,000	3,279,000	3,434,000	3,398,000
Depreciation (Retirements) Expense					
Electric utilities	4,280,000	4,865,000	5,216,000	5,233,000	5,314,000
Gas utilities	569,000	704,000	919,000	1,019,000	1,044,000
Telephone utilities	2,770,000	2,981,000	2,976,000	3,326,000	3,672,000
Water utilities	740,000	780,000	844,000	891,000	936,000
Tax Expense					
Electric utilities	4,408,000	5,160,000	5,932,000	6,310,000	6,745,000
Gas utilities	1,617,000	1,669,000	1,713,000	1,809,000	1,889,000
Telephone utilities	1,458,000	1,515,000	1,789,000	1,686,000	1,835,000
Water utilities§	1,047,000	1,083,000	1,140,000	1,232,000	1,314,000
Average Book Value of Fixed Capital¶					
Electric utilities	Not compiled	224,900,000	244,000,000	263,600,000	279,200,000
Gas utilities		57,300,000	63,400,000	69,000,000	71,900,000
Telephone utilities		65,800,000	71,900,000	81,000,000	89,400,000
Water utilities		62,600,000	66,300,000	70,000,000	73,400,000

* Including Wisconsin operations of all utilities classed as A, B, C, or D, which includes all electric and water utilities having over $5,000 annual revenue, all gas utilities, and all telephone utilities of over $3,000 annual revenue. Practically all the electric utilities industry in Wisconsin is included, all the gas industry, about 99% of the telephone business, and about 97% of the water utility business.

† Revenue received by Wisconsin Electric Power Co. from the Milwaukee Electric Railway and Light Co. for the Lakeside plant is excluded from this table.

‡ Including uncollectible bills; excluding depreciation and taxes.

§ Including estimated taxes for the Milwaukee water department at the local and school tax rates.

¶ Average fixed capital was computed as the simple average of yearly beginning and closing balances after adjustment for estimated distribution of (1) property joint to several utility services, and (2) of property not classified by utility services. These estimated amounts are insignificant in the telephone and water utilities; in the electric utility this item at December 31, 1931 was 20% of the total fixed capital; and in the gas utility, 15%. Fixed capital employed in operations outside of Wisconsin is not segregated on the reports, and was estimated on the basis of out-of-state revenue. Electric fixed capital includes all power property of joint electric and electric railway utilities, and is thus slightly overstated.

Depreciation Ratios

Depreciation or retirement expense theoretically depends on the amount of fixed capital employed and the rate at which it wears out, or becomes obsolete or inadequate. Under current accounting practices in the electric and gas utilities, however, retirement expense is likely to be adjusted to meet financial needs. In the telephone and water industry the amount of depreciation accrued corresponds more nearly to theoretical depreciation, and is commonly set up as a definite percentage of fixed capital.

No matter how depreciation expense is computed, provision for it must be made out of earnings and it will be illuminating to compare the ratio of this item to total operating revenue.

	Ratio of Depreciation (Retirement) Expense to Operating Revenue				
	1927	1928	1929	1930	1931
Electric utility...	10.0%	10.5%	10.3%	10.0%	10.4%
Gas utility.....	4.6	5.3	6.4	6.9	7.3
Telephone utility.	14.1	14.3	13.3	14.6	16.5
Water utility....	9.9	10.1	10.2	10.5	11.0

The electric utility's ratio of retirement expense to operating revenue increased in 1928, and then declined in 1929 and 1930. In 1931 an increase was registered to 10.4%, approximately the 1928 level. The gas utility, on the other hand, shows a steady increase in the ratio of retirement expense to revenue, from 4.6% in 1927 to 7.3% in 1931. This utility's ratio was less than one-half the electric utility's ratio in 1927, and almost three-fourths of the electric utility's ratio in 1931. The telephone utility's ratio of depreciation expense to revenue dropped from a fairly stable level of about 14.2% in 1927–28 to 13.3% in 1929, in which year the depreciation rates of the Wisconsin Telephone Company were revised. In 1930 an increase of 10% in the ratio took place, and in 1931, 13%. These increases reflect the large increase in telephone fixed capital in this period. The ratio of depreciation expense to revenue in the water utility showed a regular increase from 9.9% in 1927 to 10.5% in 1930, and a sharper increase to 11% in 1931.

Although depreciation accruals are provided from operating revenue, and thus may with value be compared to revenue, it is also true that their ultimate purpose is to care for the wasting-away and the obsolescence or inadequacy of property and plant; hence depreciation accruals may be even more profitably compared to plant values. Data on the actual cost of constructing property and plant are not available, even in many cases to the utility companies themselves. The closest approximation to this, book value of fixed capital, includes organization expense, stock-selling expense, and similar items, in addition to plant. Furthermore, book value of fixed capital may, and undoubtedly does, include many "write-ups" arising from the purchase of properties in the consolidation era at prices well in excess of original cost of construction. This item is probably most significant in the electric utility. Partially offsetting this is the fact that in smaller companies and in municipal plants many costs properly chargeable to construction were not capitalized but were charged to expense. Finally, several rough estimates were necessary to arrive at total book value of fixed capital used in Wisconsin operations. These estimates are described in a footnote of Table I.

Keeping in mind all these deficiencies of book value of fixed capital as a measure of construction cost of plant, we can only hopefully assume that their effect is not so great as to invalidate our ratios.

These ratios are summarized as follows:

	Ratios of Depreciation (Retirement) Expense to Average Book Value of Fixed Capital			
	1928	1929	1930	1931
Electric utility	2.2%	2.1%	2.0%	1.9%
Gas utility	1.2	1.4	1.5	1.5
Telephone utility	4.5	4.1	4.1	4.1
Water utility	1.2	1.3	1.3	1.3

In the electric utility the ratio of retirement expense to fixed capital was 2.2% in 1928, and declined regularly during the next three years to 1.9% in 1931. This ratio in the gas utility, on the other hand, increased markedly from 1.2% in 1928 to 1.5% in 1930, and remained stable in 1931. In the telephone utility, depreciation expense was 4.5% of fixed capital in 1928, and after revision of depreciation rates was 4.1% in each of the following three years. Depreciation expense in the water utility was stable at about 1.3% of fixed capital throughout the period.

Tax Expense Ratios

Tax expense is an item over which utility managements have little control. The amount of taxes is assessed by governmental agencies and utilities pay whether they like it or not. Water utilities are almost always conducted by municipalities and hence might be expected to pay no taxes. However, the policy of the Wisconsin Public Service Commission and its predecessor, the Railroad Commission, for years has been to require municipal utilities to set up tax expense at the local and school tax rate based on book value of plant at the average ratio of assessed to full value. Obviously, however, complete compliance with this requirement is too much to expect. The largest case of non-compliance is the Milwaukee water department. This case bulks so large in the total that tax expense for this utility was estimated on the basis outlined. No other large municipal water utility failed to charge taxes on its books.

	Ratio of Tax Expense to Operating Revenue				
	1927	1928	1929	1930	1931
Electric utility	10.3%	11.1%	11.7%	12.1%	13.1%
Gas utility	13.0	12.5	11.9	12.3	13.3
Telephone utility	7.4	7.3	8.0	7.4	8.2
Water utility	14.0	14.0	13.8	14.5	15.4

Tax expense in the electric utility, when expressed as a percentage of operating revenue, shows a regular increase from 10.3% in 1927 to 13.1% in 1931. In the gas utility, this ratio declined from 13.0% in 1927 to 11.9% in 1929, practically the same ratio as in the electric utility, and rose again in the next two years, remaining at the level of the electric utility. The gas utility ratio of taxes to revenue in 1931 (13.3%) was only slightly higher than in 1927.

The telephone utility tax ratio for three years, 1927, 1928, and 1930, was approximately 7.4%. The increase to 8.0% in 1929 was attributable to extraordinarily large income taxes for that year. The 1931 increase resulted from the passage of a new telephone taxation law. In the water utility, taxes were almost stable at 14% in 1927–28–29, and increased sharply in the next two years to 15.4% in 1931.

Taxes of all utilities except the telephone industry under Wisconsin laws are based on an assessed value of physical property and, through the federal and state income taxes, on net income. Telephone utilities are taxed on the basis of gross receipts and on net income. Thus, not all taxes are related to property, but nevertheless it should be interesting to compare the ratios of tax

expense to book value of fixed capital.[2]

	Ratios of Tax Expense to Average Book Value of Fixed Capital			
	1928	1929	1930	1931
Electric utility	2.3%	2.4%	2.4%	2.4%
Gas utility	2.9	2.7	2.6	2.6
Telephone utility	2.3	2.5	2.1	2.1
Water utility	1.7	1.7	1.8	1.8

Ratios of tax expense to fixed capital exhibit considerable stability. Perhaps the most striking change is a decrease in the gas utility ratio from 2.9% in 1928 to 2.6% in 1930–31. The ratios of the telephone industry in 1928 and 1929 were considerably higher than in 1930 and 1931, probably because of higher income taxes in these years. Income taxes have more effect on the tax item in the telephone utility than in other utilities because of the predominant use of capital stock for financing this industry in Wisconsin.

Capital Turnover Ratios

The capital turnover ratio, when computed as the ratio of fixed capital to operating revenue, expresses the number of years it takes to "turn" completely fixed capital. A capital turnover ratio of five means that the utility has five times as much fixed capital as it has annual revenue. A small ratio indicates a rapid turnover; a large ratio, slow turnover. Other things being equal, a high capital turnover ratio indicates that a high proportion of each dollar of revenue goes to meet fixed charges on capital.

Probably the chief value of the capital turnover ratio is that it indicates the relative efficiency with which a utility uses its property and plant. It is affected, of course, by the degree of mechanization of an industry in different years. The following table presents capital turnover ratios for the four industries studied.

	Ratios of Average Book Value of Fixed Capital to Total Operating Revenues*			
	1928	1929	1930	1931
Electric utility	4.9%	4.8%	5.1%	5.4%
Gas utility	4.3	4.4	4.7	5.1
Telephone utility	3.2	3.2	3.6	4.0
Water utility	8.1	8.0	8.2	8.6

* The reader is referred to the section on depreciation expense for a discussion of book value of fixed capital as a measure of property and plant.

This table exhibits in general a tendency for capital turnover to become slower in 1930 and 1931. This tendency is the result of (1) a much slower increase of revenue in 1930 than in former years and an actual decrease in revenue in most instances in 1931; and (2) an unslackened, and in the telephone utility, increased construction activity in 1930, with substantial construction in 1931, when, except in the gas utility, construction was over half the 1930 amount.

Comparing the increases in the turnover ratios (slowing down of turnover), it is noted that the water utility has fared the best with only a 7½% increase in the ratio from 1929 to 1931. This comparatively favorable showing was the result, undoubtedly, of the stability of water revenue in 1931. The electric industry comes next with a 12½% increase in its ratio (between 1929 and 1931), followed by the gas industry with a 16% increase. The telephone utility shows the largest increase in the capital turnover ratio, from 3.2 to 4.0, or a 25% increase.

Before closing it may be desirable to point out that the relative size of the capital turnover ratios will explain many

[2] The deficiencies of book value of fixed capital as a measure of cost of property and plant were discussed under depreciation expense.

of the differences noted among the utilities in regard to ratios of operating expenses, depreciation expense, and tax expense to operating revenue.

Conclusions

Utilities generally have been able to meet the problem of decreased revenue during the depression only by cutting operating expenses. Depreciation expense, except where the relationship of this item to fixed capital has been disregarded, has increased sharply. Tax expense has also increased, both absolutely and in relation to revenue.

Capital turnover has slowed down materially in 1930 and 1931, as a result of stable or somewhat decreased revenue coupled with increasing fixed capital. The increase in capital turnover ratios reflects an influence which has proved to be the undoing of many industries—namely, inflexibility in adjusting productive plant to consumption needs.

Recent Trends in City and Country Populations

By W. RUSSELL TYLOR*

THE quantity and movements of populations in their qualitative aspects, together with the relationship between population and land resources, are ultimate factors determining national and community life. Social trends and policies must be analyzed and envisioned in the light of population trends. Policies of land utilization, which are concerned with the determination of the most economically productive use of land and with the increase and stabilization of land values; the relation of these programs to the more pressing problems of unemployment and farm relief; the fundamental bases of city and regional planning programs;[1] and the long-range policies of public utility operation—all these, and others besides, have a logical foundation in a quantitative and qualitative analysis of population and its movements. Due appreciation, therefore, of the basic trends in our city and country populations is indispensable to an understanding of the social problems inherent in an urbanized society, and to the formulation of any social plans and policies which must inevitably replace an anachronistic laissez-faire philosophy.

The 1930 or Fifteenth Census of the United States made a change in the definition of urban and rural areas. As is well known, since 1880 the Census has defined as cities all incorporated places[2] of 2,500 or more, with a slight modification with reference to parts of New England, where the practice has been not to incorporate a town as a municipality until it has attained a population considerably in excess of this amount. Hence, in 1910 and 1920, when all townships in New Hampshire, Massachusetts, and Rhode Island which had a population of 2,500 or more were classified as urban, a number of rural places were included in the urban population of these states. The 1930 Census remedied this by including as urban in these three states, in addition to the regularly incorporated cities, only those townships in which there is a village or thickly settled area having more than 2,500 population, and comprising, either by itself or when combined with other villages in the same township, more than half the total population of the township. The 1930 Census made a second change in definition whereby it included as urban all townships and other political divisions throughout the nation, not incorporated as municipalities or containing any area so incorporated, which

* For initial compilation of the data for the tables used herein, the author is indebted to his graduate student, Bernard M. Mulvaney, Instructor at St. Viator's Academy, Bourbonnais, Illinois.

[1] W. Russell Tylor, "The Importance of the Human Factor in City Planning," *Illinois Municipal Review*, December, 1932, pp. 238-243; also *Mechanical Engineering*, December, 1932, pp. 831-836.

[2] In response to the author's inquiry as to the number of unincorporated places, a communication from the Bureau of the Census states in part: "The Bureau of the Census has no official record of all of the unincorporated places in the United States . . . It is true that an effort was made by the Bureau in 1930 to secure the population of the larger unincorporated places . . . In answer to various requests, we have taken off the population shown on the 1930 schedules for a number of the unincorporated places . . . Of course, as the unincorporated areas have no definite limits, the population reported is necessarily only approximate."

had a total population of 10,000 or more and a population density of 1,000 or more per square mile.

The result of the first change in definition was to transfer in 1930 from the urban population back to the rural in the three New England states a total of 76 towns, involving a population of 288,621, which would have remained urban under the 1920 definition. The contrary result of the second change in definition was to add to the 1930 urban population a total of 28 townships, outside of New England, with an aggregate population of 573,329. Thus the net result of these changes in definition was to increase the 1930 urban population by 284,708, or more than a quarter of a million over and above what it would have been had the classification remained in accordance with the 1920 Census definition of urban areas. This change, although bearing but slightly on the percentage of the urban to the total United States population, is nevertheless sufficient to increase the 1930 urban percentage to 56.2 instead of 55.9, which it would have been had the 1920 definition of urban population been employed in 1930.

Rates of Urban and Rural Increase

However, this change in definition has more significance, especially in conjunction with another factor to be noted, when we consider the respective decennial rates of increase of the rural and urban populations (Table I). Consider, for example, the rural population which increased 4.7% between 1920 and 1930. Since the 1930 rural population lost over a quarter of a million merely by change in definition, and since it lost further by classifying as urban all rural towns in 1920 which during the decade had attained more than 2,499 population, the above 4.7% rural decennial increase becomes an understatement. If, instead, only the same rural communities are taken in 1930 as were taken in 1920, then by 1930 a rural gain of 8.8% may be noted over 1920.[3] In the

[3] P. K. Whelpton, "Population", 36 *American Journal of Sociology* 874 (May, 1931).

TABLE I. UNITED STATES TOTAL, URBAN AND RURAL POPULATIONS, WITH RESPECTIVE RATES OF INCREASE AND PERCENTAGE URBAN, BY CENSUS DECADES.*

Year	Total Population		Urban Population			Rural Population	
	Number	Percentage Increase	Number	Percentage of Total	Percentage Increase	Number	Percentage Increase
1930	122,775,046	16.1%	68,954,823	56.2%	26.9%	53,820,223	4.7%
1920	105,710,620	14.9	54,304,603	51.4	28.8	51,406,017	3.2
1910	91,972,266	21.0	42,166,120	45.8	38.0	49,806,146	9.0
1900	75,994,575	20.7	30,380,433	40.0	36.0	45,614,142	12.0
1890	62,947,714	25.5	22,298,359	35.4	55.0	40,649,355	13.0
1880	50,155,783	30.1	14,358,167	28.6	.....	35,797,616	.....
1870	38,558,371	22.6	.....	.....	.....	.....	.....
1860	31,443,321	35.6	.....	.....	.....	.....	.....
1850	23,191,876	35.9	.....	.....	.....	.....	.....
1840	17,069,453	32.7	.....	.....	.....	.....	.....
1830	12,866,020	33.5	.....	.....	.....	.....	.....
1820	9,638,453	33.1	.....	.....	.....	.....	.....
1810	7,239,881	36.4	.....	.....	.....	.....	.....
1800	5,308,483	35.1	.....	.....	.....	.....	.....
1790	3,929,214	.....	.....	.....	.....	.....	.....

* Compiled from *15th United States Census*, Vol. I, Population, Tables 2 and 3, pp. 6 and 8.

same way, if only the same centers which were urban in 1920 are considered in 1930, the rate of increase of the urban population becomes 23.1% instead of the Census figure of 26.9%.[4] Thus a too ready interpretation of the Census figures overstates the rate of urban increase as it in turn understates that of the rural increase. Whereas apparently on the face of the Census figures the urban population increased during the past decade at a rate nearly six times the rate for the rural population, in the light of the above modifications the rate of urban increase was but slightly over 2½ times as large as the rate of growth of the rural population.

If the modified rates of increase are further compared with the similarly modified rates of the preceding decade, then the 1920-1930 rural rate of increase (8.8%) is seen to be somewhat larger than the rural modified rate (6.8%) for 1910-1920, whereas the 1920-1930 urban rate of increase (23.1%) is slightly less than the modified rate of urban increase (24.5%) for the preceding decade. Because of the decrease in the farm population, we might expect that the rural rate of increase would have been lower in this last decade than in the previous one, and that the urban rate would have been higher. However, both rates have been conditioned by movements in the village population as well. This slowing down in the decennial rate of urban increase, together with the increase in the decennial rate of rural growth, is one of the general indications of the decentralization of our population.

A further word of caution is in order, in passing, particularly in the comparisons of interdecennial trends. A Census decade does not necessarily cover exactly 10 years, or 120 months. The Fourteenth Census covered the period from April 15, 1910 to January 1, 1920, or 116½ months. The Fifteenth Census, in contrast, covered 123 months, or from January 1, 1920 to April 1, 1930. It is readily seen that the periods are not exactly comparable since there is a full half year's difference, although for most purposes this discrepancy is ignored. Had the last Census period, however, been 120 months instead of 123, the various rates of increase would have been lowered a few decimals.

Urban Trends

In line with the more rapid growth of the urban relative to the rural population in this last Census decade, we find that population growth throughout the various geographic divisions was correlated essentially with the distribution of the urban people. As in the previous decade, the Middle Atlantic and the East North Central states had the largest numerical increase. The Pacific states were third in order, but they in turn had by far the highest rate of increase of any geographic division (Table II). These three divisions comprise nearly half (48.5%) of our total population and have furnished 62.2% of our national growth.

The New England states offer an anomaly. Essentially because of the 1930 Census change in definition of urban populations, this geographic division surrendered its first place in the rank of urbanized divisions to the Middle Atlantic division. Although the difference in the proportion of the urban population in the two divisions is only slight (.4%), it is sufficient to cause New England to drop to second place.

Although virtually as high in the percentage of urban population as the Middle Atlantic division, New England's total rate of increase was the lowest of all except the West North Central

[4] *Ibid.*

division, and its urban rate of increase was by far the lowest, as it was also in the preceding decade. New England is fast approaching the state of urban saturation. This slackening on the part of New England is offset by the rate of urban growth in the West South Central and Pacific states. Incidentally, the West South Central is the only rural division that maintained a total rate of increase equal to the national rate of growth.

Divisions which were rural in 1910 are rural now and will be rural in 1940, unless they alter the rate of their urban growth. Although the ratio of the urban population in the East North Central and Middle Atlantic states to the total urban population has fallen slightly between 1910 and 1930, the urban population in the Pacific states showed a decennial increase of 59.4% between 1920 and 1930, indicating a westward shift in the urban population. In 1920 the Pacific division had 6.5% of the total urban population, but now it has 8%. In 1930 the four "urbanized" geographic divisions (New England, Middle Atlantic, East North Central, and Pacific)—i. e., those with more than half their populations classed as urban—comprised 71.2% of the total urban population, or just 1% less than they did in 1920, and contributed 66.68% of the total national population growth. More than half of our urban population (virtually 54%) is found in the states lying between New York and Chicago, or in the two highly urbanized divisions—the Middle Atlantic and the East North Central. Parenthetically, there are only three states in the Union—namely, New York, Pennsylvania, and Illinois—with a population greater than that of New York City, although Ohio approximates it. In general, our divisional increase in population corresponds with the decline in the proportion of agricultural workers.

In passing it is interesting to note that California, now nearly ¾ (73.3%) urban and consequently on a par with the eastern geographic divisions, and Florida, with a little more than half (51.7%) its population classed as urban, had the largest rates of total population increase of any of the states—65.7% and 61.5% respectively. As a column in *The Nation* has expressed it:

"No doubt this great growth in our two leading playground states reflects the rise of a leisure class able to retire and build Spanish houses in the sections famous for their climate and scenic beauty. But most of the

TABLE II. GEOGRAPHIC DIVISIONS WITH

Division	Percentage of Total Population	Persons per Square Mile†		Total Population†	Increase from 1920‡		
		1920	1930		Number	Percentage	Percentage of Total Increase
United States	100.0%	35.5	41.3	122,775,046	17,064,426	16.1%	100.0%
New England	6.7	119.4	131.8	8,166,341	765,432	10.3	4.48
Middle Atlantic	21.3	222.6	262.6	26,260,750	3,999,606	18.0	23.4
East N. Central	20.5	87.5	103.0	25,297,185	3,821,642	17.8	23.4
West N. Central	10.7	24.6	26.0	13,296,915	752,666	6.0	4.4
South Atlantic	12.5	52.0	58.7	15,793,589	1,803,317	12.9	10.0
East S. Central	8.0	49.5	55.1	9,887,214	993,907	11.2	5.7
West S. Central	1.7	23.8	28.3	12,176,830	1,934,606	18.9	11.3
Mountain	3.0	3.9	4.3	3,701,789	365,688	11.0	2.1
Pacific	6.7	17.5	25.8	8,194,433	2,627,562	47.2	15.4

* Compiled from *15th United States Census*, Vol. I, Population, Tables 6, 7 and 9, pp. 12, 13, and 15.
† *Ibid.*, Table 7, p. 13.

people of these states are still compelled to earn their living, and a large part of California's gain is the result of the growth in the single city of Los Angeles, which has more than twice the population it had ten years ago."[5]

In connection with this territorial concentration and increase of our urban population two further trends may be noted, when cities are arranged by classes so as to permit tracing their growth when they change classes—i. e., by considering, as the Census does not, the same cities in each size group at the beginning and at the end of a decade, and allowing for annexations, as Whelpton[6] has done (Table III). These two striking trends are: the increasing rate of urbanization in our largest cities, those of a half a million and over, and likewise in our smallest, those under 15,000. This last development again reflects decentralization, or the suburban trend. The classes of cities between these two extremes all declined in their rates of increase during the past decade compared with the preceding one. From this standpoint our cities are growing at an increasing pace at the very top and bottom of the urban size classes only.

At the same time and on the same basis of classification the cities showing the largest rate of increase in the last decade are those in the 25,000-50,000 group and this rate of increase was only .2% below the corresponding figure for the period 1910-20. In the decade 1910-20, however, the 250,000-500,000 group showed the largest rate of increase (34.9%), whereas in 1920-30 this figure was more than cut in two (15.4%). Moreover, the second largest rate of gain this past decade was for cities under 15,000, which constitute essentially a suburban group, as do those having the highest increase; and these smaller cities increased at a more rapid rate than they did the preceding decade. Thus the suburban trend is strikingly evidenced. On the Census classification basis a record gain was that of Beverly Hills, suburban to Los Angeles, which increased from 674 in 1920 to 17,428 in 1930, or 2,485%.

In striking contrast to the pace of urbanization heretofore indicated, no Census prior to 1930 has shown so many cities which were urban at the beginning of the decade actually decreasing in population. In all there

[5] "How We Grow", *The Nation*, August 20, 1930, p. 196.

[6] Whelpton, *op. cit.*, p. 876.

VARIOUS DATA AS NOTED FOR 1930.*

Urban Population§						Rural Population§	
1920			1930				
Number	Percentage	Percentage Increase	Number	Percentage	Percentage Increase	1920	1930
54,304,603	51.4%	28.8%	68,954,823	56.2%	26.9%	51,406,017	53,820,223
5,865,073	79.2	17.3	6,311,976	77.3	9.3	1,535,836	1,854,365
16,672,595	74.9	20.5	20,394,707	77.7	22.3	5,588,549	5,866,043
13,049,272	60.8	35.7	16,794,908	66.4	28.7	8,426,271	8,502,277
4,727,372	37.7	22.0	5,556,181	41.8	17.5	7,816,877	7,740,734
4,338,792	31.0	40.3	5,698,122	36.1	31.3	9,651,480	10,095,467
1,994,207	22.4	26.7	2,778,687	28.1	39.3	6,899,100	7,108,527
2,970,829	29.0	51.8	4,427,439	36.4	49.0	7,271,395	7,749,391
1,214,980	36.4	28.2	1,457,922	39.4	11.7	2,121,121	2,243,867
3,471,483	62.4	45.7	5,534,881	67.5	59.4	2,095,388	2,659,552

‡ *Ibid.*, Table 6, p. 12.
§ *Ibid.*, Table 9, p. 15.

were 532 of these in 1930, as compared with 393 the preceding decade (Table III). In line with this trend we also have fewer new cities appearing in this past decade than in the preceding one (378 as contrasted with 474).

As stated above, when all cities are considered together their rate of increase declined slightly between 1920 and 1930 compared with the preceding Census period. A variety of causes may be suggested for this decline in the rate of urban increase. In the first place a generally declining national rate of increase (Table I) may be expected to involve a lowering of the urban rate of growth, when it is appreciated that the urban growth during this past decade represented 85.8% of the national increase. Both rates of increase are, in turn, affected by a declining birth rate and declining rate of natural increase,

TABLE III. THE GROWTH OF CITIES,* BY SIZES.†

Size of Cities at Beginning of Decade	Rate of Increase by		Cities Decreasing by	
	1930	1920	1920	1930
Over 1,000,000	24.1%	19.3%	...	...
500,000-1,000,000.....	21.8	20.0	...	...
250,000- 500,000.....	15.4	34.9	...	...
100,000- 250,000.....	20.2	22.3	...	4
50,000- 100,000.....	23.0	31.0	2	12
25,000- 50,000.....	26.3	26.5	8	9
15,000- 25,000.....	24.0	29.4	15	32
10,000- 15,000.....	26.2	23.2	32	45
5,000- 10,000.....	25.3	21.6	90	143
2,500- 5,000.....	25.0	22.6	246	287
.....				
.....	23.1%	24.5%	393	532

* The number of cities in certain size groups is different from that shown by the Census for the following reasons: (a) Small cities which were annexed to larger cities during the decade are combined with them at the beginning of the decade and not listed separately. This may shift the annexing city to a larger size group. (b) In 1930 the Bureau of Census transferred from urban to rural certain townships in New Hampshire, Massachusetts, and Rhode Island. These have been considered here as being rural in earlier census years. (c) The Bureau of the Census also transferred certain unincorporated places from rural to urban groups. These have been considered here as being urban in earlier census years, if their population was sufficiently large. Moreover, the population of each city at the beginning of the decade includes that of places annexed during the decade whenever this adjustment could be made; this method includes nearly every annexation and all the important ones.

† Taken in part from Whelpton, "Population", 36 *American Journal of Sociology* 876 (May, 1931).

which are particularly marked in urban areas. Moreover, as immigration is reduced, our population growth becomes checked in a two-fold manner: (1) by direct cessation of a net balance of immigrants entering our borders; and (2) by the still further lowering of the birth rate as a result of the passing of the heretofore most fertile foreign-born women into the older age groups. Again, the "back to the farm" movement, which became evident about the time the 1930 Census was taken, likewise diminished the net movement from farms to cities.

Metropolitan Districts

One of the significant urban phases of the Fifteenth Census is the changed definition of Metropolitan Districts. In 1920 a Metropolitan District had as its nucleus a city (or twin city) having at least 200,000 inhabitants, and comprised the central city and the population in those suburban areas which lay within approximately 10 miles beyond the municipal limits and in which the density of population was 150 per square mile or more. This definition yielded 29 such districts, comprising 32 central cities. On the basis of this 1920 definition the number of Metropolitan Districts in 1930 would have increased to 39.

However, the 1930 Census has defined 96 Metropolitan Districts, each having an aggregate population of 100,000 or more (not to be confused with the 93 cities of 100,000 or more population), and containing as the nucleus one or more central cities of 50,000 or over. In all, these 96 districts comprise 120 such cities. A 1930 district also comprises, in addition to the central city nucleus, all adjacent and contiguous civil divisions having a density of not less than 150 inhabitants per square mile—not, however, necessarily limited to the 10-mile radius—and adds further

those civil divisions which have a density of less than 150 per square mile provided they are directly contiguous to the central cities or are nearly or entirely surrounded by minor civil divisions having the required density. In both Censuses, of course, strictly rural area, adjacent to the central city or cities, is not included within the Metropolitan Districts, but is included, along with the district population as defined, in what is officially designated as the Metropolitan Area. Of the total population of the 1930 Metropolitan Districts, which in turn comprises nearly half the total population of the United States, by far the greater proportion (69.1%) is contained within the central cities themselves.

In spite of the change in definition, it is possible to compare the 1920 and 1930 population trends in 85 of the 96 districts defined in 1930; the 85 are assumed as Metropolitan Districts in 1920 on the basis of the 1930 definition. Incidentally, these 85 districts in 1930 contain almost as many people as comprise our rural population.

Comparisons of the population growth within the cities and within their suburbs in these districts indicate further the importance of the suburban trend. In the Metropolitan Districts with a population over a million, of which there are 10, the rate of increase in the suburbs is phenomenally greater than that in the parent cities (Table IV). It is virtually double in Detroit and in the San Francisco-Oakland District; nearly triple in Chicago, Pittsburgh, and the New York-North East New Jersey District; six-fold in Philadelphia; more than ten-fold in St. Louis; and nearly eleven-fold in Cleveland. New York City's relative disadvantage in growth in comparison with the growth of its suburbs is partly explicable in the light of Manhattan's actual 18% decrease in population during this last decade, although the City as a whole (all five boroughs) increased 23.3%, which is a little less than Chicago's rate but more than three times that of Philadelphia.

Many Metropolitan Districts of less than a million population exhibit equally phenomenal suburban rates of increase relative to their central cities' rates (Table V). No district with 300,000 or more population in 1920, except Louisville, showed a larger rate of increase in 1930 in the cities than in the suburbs. This was also true of districts having more than 300,000 each in 1930, with the exception of Dallas and Akron, where, as in Louisville, the rates of increase for the central cities exceeded those of the suburban areas. In all 85 Metropolitan Districts the suburban

TABLE IV. METROPOLITAN DISTRICTS WITH 1,000,000 POPULATION IN 1930.*

Metropolitan District	Population	Percentage Increase	Population of Cities	Increase in Cities	Increase in Suburbs
New York-N. E. New Jersey	10,901,424	28.2%	7,942,600	20.9%	52.4%
Chicago	4,364,755	33.4	3,376,438	25.0	73.4
Philadelphia	2,847,148	16.1	1,950,961	7.0	42.6
Los Angeles	2,318,526	.....	1,238,048	114.7	.....
Boston	2,307,897	14.9	781,188	4.4	21.2
Detroit	2,104,764	68.0	1,568,662	57.4	108.9
Pittsburgh	1,953,668	15.1	669,817	7.2	19.8
St. Louis	1,293,516	20.7	896,307	6.7	71.3
San Francisco-Oakland	1,290,094	33.8	918,457	27.0	53.9
Cleveland	1,194,989	27.7	900,429	11.8	125.8

* Compiled from *15th United States Census*, Vol. I, Population, Table 4 (Metropolitan Districts).

rate of increase was higher than the central city rate in over 70% of the cases. Furthermore, in all these Metropolitan Districts as a class, the rate of increase in the suburbs (39.2%) was almost exactly twice that of the central cities (19.4%). Furthermore, the suburbs contributed half of the numerical increase which took place in the Metropolitan Districts during the decade.

TABLE V. SOME STRIKING EXAMPLES OF THE DIFFERENT RATES OF GROWTH FOR CITY AND SUBURBS OF METROPOLITAN DISTRICTS IN 1930.*

Metropolitan District	Rate of Growth in	
	City	Remainder of District
Baltimore	9.7%	72.2%
Cleveland	11.8	125.8
Denver	12.2	79.9
Grand Rapids	22.5	131.9
Indianapolis	15.9	80.4
New Haven	.1	36.0
Philadelphia	7.0	42.6
Reading	3.1	61.6
Richmond	6.6	61.8
Rochester, N. Y.	10.9	112.4
Spokane	6.6	35.6
Tacoma	9.4	35.0

* Compiled from *15th United States Census*, Vol. I, Population Table 4 (Metropolitan Districts).

As the large city itself drew from the rural classes two decades ago, today the Metropolitan District—the city together with its suburbs—is drawing not only from the rural but also from other urban territory surrounding it, as evidenced by the increasing number of cities already mentioned as losing population. Specifically, this absorbing tendency on the part of larger areas has produced actual declines in population in several important centers. Thus Lowell, New Bedford, Fall River, and Holyoke declined because of Boston's greater power of attraction, just as Wilmington, Delaware, also lost population as a result of too great proximity to Philadelphia and her suburbs. However, in the former area especially, the shifting of industries to sites nearer the source of raw materials is undoubtedly a factor. In the nation at large it is the urban trend; in the urban population itself, it is the Metropolitan Districts trend; in the Metropolitan Districts, it is the suburban trend. Perhaps, then, instead of characterizing our national tendency as "urban," we should say "suburban."

This suburban trend is further evidenced in the decentraliztion of industry which has given such places as Dearborn, Michigan, Aliquippa, Pennsylvania, West Allis, Wisconsin, and Wyandotte, Michigan status as enterprising cities. While these places are virtual suburbs, they are relatively independent in their maintenance, and capable of drawing further population. Thus Akron, a city resulting from this territorial decentralization of industry, continued to grow faster this last decade than its own suburbs.

The Farm Population

The farm population of the United States reached its peak in 1910 with an estimated 32,076,960 persons, according to the United States Department of Agriculture. This meant one person in every three at that date. Today it amounts to but one person in every four.

The 1920 Census, for the first time, gave a separate enumeration of farmers and the number declined to 31,614,269. This Census defined the farm population as those persons living on farms, and those farm laborers and their families who, while not living on farms, did live in rural territory outside of any incorporated place. The 1925 Agricultural Census revised this initial definition of farm population by omitting the clause referring to the farm laborers living off the farms and thereby limiting the number strictly to persons actually residing on farms, including, of course, considerable

numbers of persons engaged in occupations other than agriculture. The number of farm laborers thus affected further reduced the 1920 farm population, on the basis of the 1925 definition, to around 31,000,000, or 29.9% of the total population. The enumerated farm population as of January 1, 1925 had still further declined to 28,981,668, or 25.9% of the total.

The 1925 Agricultural Census also changed slightly the definition of a farm and hence also of a farmer, since the number in each category is identical; a farmer is a person who operates a farm, either performing the labor himself or directly supervising it. Conversely, a farm thus becomes all the land which is directly farmed by one person (or partnership). A farm is now any tract of three acres or more used for agricultural purposes, and also any tract containing less than three acres which produced as much as $250 worth of farm products in 1929. The 1920 definition, apart from making the reference date 1919, contained in addition the clause, "or which required for its agricultural operations the continuous services of at least one person." The omission of this clause in the 1925 definition resulted in a large number of farms being then reported, especially in New England, where the owner spent most of his time in some occupation other than farming.

In spite of this change the 1925 Census disclosed a decrease in the number of farms, and consequently of farmers, for the country as a whole for the first time in American history. Two major causes of this decline may be suggested: the tendency toward larger farms as the result of wider use of machinery and abandonments and foreclosures which followed the 1920 inflation.

The 1930 Census revealed a still further reduction, leaving a total of 6,288,648 farms or farmers. Although the number of farms decreased, the amount of all land in farms increased 3.2% during the past decade, amounting to slightly more than half (51.8%) of the land area of the nation. The average acreage of all farm land correspondingly increased over the preceding Census, amounting in 1930 to 156.9 acres.

The 1930 farm population was 30,445,350, or 24.7% of the total population and 56% of the total rural population. According to the United States Department of Agriculture[7] the low point in the number of persons living on farms since 1910 seems to have been reached about January 1, 1930. This had increased by January 1, 1932 to 31,241,000, or not quite three quarters of a million short of the 1910 peak. The increase of the farm population during 1931 was the largest and most significant recorded by the United States Bureau of Agricultural Economics since it began estimating farm population changes at the beginning of the last decade, throughout which in the main the population was steadily declining. The net gains during 1930 and 1931 offset all but 373,000 of the 1,445,000 loss occurring between January 1, 1920 and January 1, 1930.

During 1930, population movements to and from the farm almost balanced one another, although a slight net movement in favor of the farm population was discernible. This net movement was much more pronounced in 1931, for it, together with the natural increase of the farm population for that year, brought the total gain up to 656,000. The year 1931 as compared with 1930, however, showed a decrease in the total number of persons going back to the farm but at the same time a considerable decrease

[7] *The Agricultural Situation*, monthly bulletin of the Bureau of Agricultural Economics, United States Department of Agriculture, November 1, 1932, p. 2.

also in the number going to the cities.[8]

The latest survey by the Bureau covers the two months' period, January 1 to March 1, 1932. This reveals an estimated net gain to the farm population of 263,000 of which amount 132,000 represent the net movement from cities to farms. At this rate the possibility is that the net gain for 1932 will equal that of 1931. If so, the farm population of January 1, 1933 will be the largest since 1920 and less than 200,000 below, or virtually at the level of, the 1910 peak.[9]

However, the increasing farm population—a product of the depression—is after all rather a diminished rural exodus than a pronounced trek back to the farm. The above figures, of course, do not take into account the increased planting of small subsistence gardens of less than three acres on the part of city folk, which is a modified form of increasing agricultural activity but which cannot be interpreted as adding to any farm population.

At the same time, the late decennial increase, already noted, in the rural population and the total rural rate of increase, as distinct from the farm population, are partially attributable to the development of "acre-lot" or "amphibian farming" colonies on the urban fringe, which amount in many instances to the city laborer's country home. This is evidenced when it is noted that such urban states as Massachusetts, Connecticut, New York, New Jersey, and Pennsylvania collectively showed an increase of 1,085,345 in their rural populations, by far the greater part being assignable to city workers seeking country homes, whereas such agricultural states as Indiana, Illinois, Wisconsin, and the seven West North Central States reported a rural increase of but 70,452.[10]

A valid appraisal of the late back-to-the-farm movement occurs in the "Editorial of the Day" of the *Chicago Tribune* for July 18, 1932, taken from the *Bloomington (Illinois) Pantagraph.* The caption is "Why Back to the Farm." In summary, it states that the back-to-the-farm movement has a different significance for different sections of the country. In this section of the country there is not much room for it, since returning landowners must displace the tenant on the home farm or else change his status to that of a hired man. Although a living can be had from the farm, farming is certainly not attractive from the commercial standpoint. However, on poor and cheap lands, in the eastern and southern states, where the land gives a means of living impossible to find elsewhere at present, it may serve to afford the unemployed an opportunity for the time being to be relatively self-supporting, and therefore be important as a means of unemployment relief. But many of these would-be farmers are not farmers and most of them may be expected to return to city jobs when prosperity returns. On the other hand, truck gardening on small plots on the urban fringe, which provides a measure of self-support while doing part-time city work, is an important phase of this movement, and it remains to be seen how long this phase of the present trend will be retained.

The Village Population

Concerning the rural non-farm, or village population some interesting trends are also discernible. In 1930 this classification amounted to 23,662,710, or virtually 44% of the total rural population. Of this village population, in turn, over

[8] *Ibid*, p. 4.

[9] *Ibid*, p. 2.

[10] Whelpton, *op. cit.*, p. 874.

⅛ (38.8%) is in incorporated places. In general, the total number of incorporated villages has increased with each decade since 1890, as has also the total population of such places. The last two Census periods, however, indicated that the percentage of the total population resident in incorporated villages declined.

A recent study[11] considers 12,343 of these incorporated places out of a 1930 Census total of 13,433, for which 1920 comparative data are given. Nearly half of these incorporated villages (46.1%) lost population during the decade. However, in the light of the restricted village representation of this study the authors caution against a too ready assumption that all American villages are, as a class, exhibiting a trend toward decline. Comparative data are, of course, not available prior to 1920, apart from the incorporated areas, since the farm population was first differentiated then by the Census. Moreover, the village population as a whole, i. e., the rural non-farm population, increased 18% during this past decade, or at a rate greater than that of the total United States population.

When the above mentioned incorporated villages are analyzed on the basis of size it is noted that of those less than 500 population, more than half (56.8%) lost population, while of those in the 1,000-2,500 class only about a quarter (28%) lost population. Hence, the rates of village decline seem to be in accordance with Gillette's well known generalization that "the smaller the place the greater is the liability of loss of population."

Further light on these population shifts in the village field is obtained from an unpublished study of incorporated villages in Illinois made just after Illinois' 1930 data were available. All Illinois incorporated places below 2,500 were listed for each of the last three decennial periods. Each village was checked with reference to its classification according to the following schedule:

1. Those showing a gain from 1910 to 1920 and a gain from 1920 to 1930.
2. Those showing a loss from 1910 to 1920 and a loss from 1920 to 1930.
3. Those showing a gain from 1910 to 1920 and a loss from 1920 to 1930, 1930 figure being above the 1910 figure.
4. Those showing a gain from 1910 to 1920 and a loss from 1920 to 1930, 1930 figure being below the 1910 figure.
5. Those showing a loss from 1910 to 1920 and a gain from 1920 to 1930, 1930 figure being above the 1910 figure.
6. Those showing a loss from 1910 to 1920 and a gain from 1920 to 1930, 1930 figure being below the 1910 figure.

This study seemed to indicate that villages fared less well in the decade 1920-30 than in the preceding one. Of the villages that declined between 1910 and 1920 and gained between 1920 and 1930, only 55 went above the 1910 population mark, while 90 went below it. Furthermore, of the villages that gained in the earlier and lost in the later period, 113 were above the 1910 figure still, whereas 156 dropped to a point below their 1910 status. Taking the full 20-year period, 1910 to 1930, only 377 showed a gain as against 558 which experienced a decline in population. These gains were most pronounced among those villages close to the large cities, particularly in Cook and Lake Counties.

This apparently marked increase in the number of villages, as well as in the number of cities, actually declining in population in these more recent years, together with the absence of any intrinsic gain in the farm population, might seemingly point to a pronounced centralization of our population, but

[11] S. C. and Agnes Ratcliffe, "Village Population Changes", 37 *American Journal of Sociology* 760-767 (March, 1932).

not so when it is considered in the light of the suburban trend or decentralization movement already discussed.[12] The metropolitan region is now the magnet, rather than the metropolis itself. In New York State during the past decade the cities near New York had the best rates of increase; those near Buffalo second best; and these outlying cities usually had higher rates than either New York or Buffalo.[13]

Conclusion

Thus, from whatever angle we approach the subject of population trends in America—from that of the movements in the farm population, the rural non-farm or village population, the total rural population, the total urban population, or quantitative movements as revealed in the various sized city groups—we cannot but be impressed with the increasing significance of the suburban trend, which is bringing into ever sharper focus the importance of our smaller cities and towns which are centrally located with reference to one or more dominant cities. The solutions to most of our social problems in the future will inevitably be conditioned by this increasingly manifest and important phase exhibited by the more recent trends in our city and country populations.

[12] See, further, W. Russell Tylor, "The Exodus from Rural America", *Current History*, December, 1931, pp. 404-408.

[13] S. D. Greenman, "Metropolitan Trend in New York State", *American City*, February, 1931, p. 169.

Some Current Problems of Railroad Taxation

By ALFRED G. BUEHLER

RAILROAD taxes have been imposed in this country for purposes of both regulating the steam railroads and raising revenues for governments. In fiscal practice, productivity of revenues is a primary principle and the equitable distribution of the burdens of taxation is secondary. In a logically arranged tax system, the railroads would be taxed along with other businesses in such a manner that revenue charges would be distributed with relative equity, but tax systems have evolved in political and economic compromises and not in a logical, predetermined manner. In this article it is proposed to describe briefly present methods of railroad taxation, to state some of the important problems in such taxation, and to indicate some reforms which appear to be desirable. It is realized that the problems discussed here are but a phase of the larger problems of the railroads, on the one hand, and of tax systems, on the other.

The railroads accept the inevitable conclusion that some sort of taxation is inescapable, although numerous arguments have been advanced to establish a case for lighter taxation. The railroads may be in a weakened financial condition, but other industries are suffering from the same plight.[1] It is alleged also that the automobile, which is the chief competitor of the railroads, is subsidized by government aid and, consequently, it is unfair to tax the railroads. This argument must be reserved for later consideration. The statements that the railroads are a public service industry passing on their taxes to users of their service and that these taxes may be shifted to the public only by charging rates higher than they would otherwise be, apply equally well to other public service enterprises. It seems fair that the patrons of the railroads should pay taxes when other business is being taxed.

The railroads, as common carriers serving the public, enjoy earnings only as a result of their relations with the community, and the community may logically tax their earnings. Even if a railroad enjoys no net earnings, it is theoretically receiving benefits from government in the protection of franchises and other property rights. The heavy expenditures of modern governments necessitate diversified sources of revenue, and the taxation of railroads and other corporations seems inescapable. While the railroads present peculiar tax problems, both theory and experience substantiate reasonable taxation. If railroad taxes can be shifted, it is just that the public bear those taxes; and if railroad taxes cannot be shifted, it also seems fair, from the standpoint of government, that reasonable charges should be made for the benefits enjoyed from government.

The Burden of Railroad Taxation

The railroads pay hundreds of millions of dollars annually in taxes to federal, state, and local governments. The tax load has increased both in amount and relative to net and gross earnings. During the 10 years 1921-30, while the property investment increased from $20.9

[1] The plea for tax exemption of the railroads, because they are a decreasing cost industry, has been restated recently by Professor Richard S. Merriam, "Discriminating Rates," 10 *Harvard Business Review* 453-460 (1932).

billions to $26.4 billions, the taxes of Class I railroads climbed from $276 millions to $349 millions, or from 5.0% to 6.6% of total operating revenues, and from 10.9% to 16.4% of net railway operating income. During the same period, while taxes were mounting, fuel costs fell sharply, and labor costs and costs of materials and supplies remained about the same.[2]

Although railroad taxes have shown a tendency to increase in recent years, except during the depression, this trend may merely show that the railroads were not taxed heavily enough in the past, rather than that they are taxed too heavily today. Taxes during the years 1921-30 increased at practically the same rate as the value of the property investment reported by the railroads. Writing in 1915 Professor Ripley stated, "Railroad properties, except in the East, have probably in the past too largely evaded their just proportion of taxes."[3] It must be remembered that tax collections, in general, have increased steadily of late years. Data compiled by the National Industrial Conference Board show that our total tax burden, for all grades of government, increased from $875 millions, or 7.2% of national income in 1890, to $9,792 millions, or 11.6% of national income in 1929.[4] As far as the railroads are concerned, they too have experienced mounting tax bills. In 1890 the total tax payments of steam railroads were only $32,202,469, but since that date they have steadily risen, at a rate higher than the rates of increase for population, wealth, and total taxation. Of the $397 millions collected from the railroads in taxes in 1929, the Federal Government took over $89 millions, or nearly one-fourth; the state and local governments took $306 millions, or about three-fourths; and the remainder went to Canada, Mexico, etc. About 99% of the federal tax collections are derived from the corporation income tax, while the states employ various bases of taxation. During the last decade federal railroad taxes have not shown much increase, but state and local taxes rose from $254 millions in 1923 to $306 millions in 1929. In the latter year seven states were each collecting over $10,000,000 in taxes from the railroads.[5]

Even during the depression, in spite of the downward tendency of taxes, the burden of total taxation has increased, relative to total operating revenues and to net operating income. The total taxes of steam railroads increased from 1890 to 1929 at a faster rate than all taxes for the country, but the more rapid multiplication of railroad taxes was to be expected and was justifiable, after a period of faltering taxation policies, when low taxes or tax exemptions had been permitted.

Taking the country as a whole, railroad tax collections have shown a tendency to decrease during the depression, largely as a result of the drop in the federal corporation income tax, as net earnings slumped, and of the lowered property valuations for taxation in numerous states. Taxes on gross or net earnings automatically rise and fall with business conditions, but property values for taxation tend to remain unchanged. Increased railroad taxes have been collected recently in some states, as in New Jersey, where property was valued

[2] See *Commerce Yearbook*, 1931, part I, c. XIX, and Eastern Railroads, *Yearbook of Railroad Information*, 1932, p. 14. The property investment is that reported by the railroads.

[3] W. Z. Ripley, *Railroads: Finance and Organization* (New York: Longmans, Green & Co., 1915), p. 369.

[4] National Industrial Conference Board, *Cost of Government in the United States*, 1928-9.

[5] See Bureau of Railway Economics, *Statistics of Railways of Class I*, Summary 11, 1930, sheet 10.

higher in 1931 than in 1930.[6] In some states, as in Massachusetts and Connecticut, property values have tended to remain unchanged in spite of the depression, while in numerous other states property values have been cut to yield smaller taxes. Thus, in Illinois, the assessed value of steam railroad property was $592,230,286 in 1931, or $55,336,331 less than in 1930.[7] In Indiana, railroad property was valued at $534 millions for taxation in 1929 and 1930, but was dropped to $501,552,730 in 1931, the lowest valuation since 1918.[8] The writer is advised by the Indiana Board of Tax Commissioners that railroad property was valued at 20% under the 1931 figure in 1932, in line with similar reductions in the valuation of other property.

Data assembled by the Interstate Commerce Commission for Class I railroads, showing taxes and assessments per mile of line, reveal considerable variation among the states. It must be remembered, however, that per-mile-of-line comparisons fail to take account of such items as the relative proportions of double or multiple tracking, the extent of terminals and yards, frequency of stations, etc. In 1930 the charges per mile of line ranged from a minimum of $494 in Texas to a maximum of $9,951 in New Jersey. In the same year 29 states and the District of Columbia collected over $1,000 per mile of line. The federal charges were $178, while the average for the country was $1,519.[9]

Further light on the variations in the taxation of different railroads in the United States and Canada is furnished in a study by Professor H. E. Dougall.[10] The data show that the American roads cited paid heavier taxes, relative to gross receipts and miles operated in 1926, than did the Canadian roads, and also that considerable differences obtain in the relative tax burdens of the American roads (Table I).

Changing Tax Policies

The attitudes of federal, state, and local governments toward the taxation of railroads have undergone a number of changes in our history. An interesting

[6] New Jersey State Board of Taxes and Assessment, 16th *Annual Report*, 1931, p. 6.

[7] Illinois Tax Commission, 13th *Annual Report*, 1931, p. 9.

[8] Indiana State Board of Tax Commissioners, *Annual Report for 1931*, p. 17.

[9] I. C. C., *Statistics of Railways in the United States*, 1930, 44th Annual Report, p. S 57.

[10] H. E. Dougall, "The Taxation of Railways in Canada," 5 *Journal of Land & Public Utility Economics* 405 (1929).

TABLE I. TAXES OF AMERICAN AND CANADIAN RAILROADS, 1926*

Railroad	Taxes per Mile Operated	Percentage of Gross Receipts	Percentage of Net Income before Taxes Paid	Percentage of Corporate Net Income
New York Central	$3,486	6.05%	30.18%	43.23%
New Haven	2,279	4.15	39.14	64.29
Illinois Central	1,666	6.12	40.30	68.37
Union Pacific	1,635	6.80	26.38	35.84
Southern Pacific	1,628	6.43	39.10	59.76
Northern Pacific	1,375	7.99	30.43	43.74
Great Northern	1,196	7.36	27.39	37.70
Missouri Pacific	759	4.08	35.63	55.36
Canadian National in United States	1,250	3.47	109.06	Deficit
Canadian Pacific in United States	627	5.91	103.44	Deficit
Canadian National in Canada	168	1.60	Deficit	Deficit
Canadian Pacific in Canada	413	2.70	12.60	14.70

*Dougall, *op. cit.*, p. 405.

and significant contrast to be observed is that between the present heavy taxation and the former rivalry of governments to extend financial aid to the highly coveted railways. Since the Civil War, however, the mania of public speculation in the railroads has given way to government regulation of railroad finances, rates, service, etc., and to a steadily growing burden of taxation. Opposition to the railroads and pressing needs for revenue among the states of the Middle West led to the attempt to apply the general property tax to the carriers even before the Civil War.[11]

The early theory that the railroads could be assessed and taxed by local officials under the uniform provisions of the general property tax proved defective. Railroad property is too extensive, diverse, and complicated to be valued by inexperienced local assessors who may be familiar enough with farming, retailing, and other small businesses, but who are unfamiliar with the intricacies of railroad transportation. The wide extension of facilities over an entire state, or over a number of states, has rendered impossible the equitable taxation of railroad property in fractions by many small detached communities. The general property tax was loosely administered by local officials, tax evasion was common, and the railroads often refused to supply data needed for efficient taxation. In 1900 practically all the states employed the general property tax to reach the railroads, but since that date state after state has either modified its property taxation or has turned to other methods of taxing.

These other methods of taxing railroads have been accompanied usually by the development of centralized assessment in the hands of state officials. Taxes are now imposed upon railroad property, both real and personal, upon franchises, capital stock, gross earnings, net earnings, and other bases. Gross earnings taxes, at various rates, have been popular among the states because of the theoretical ease of determining gross earnings and because of the large and stable revenues provided. But the search for a simple and easy mode of taxing railroads encountered serious difficulties in gross earnings taxation. This type of tax does not obviate costly property valuations, because the railroads must be taxed with reference to the burdens on other types of business, and for comparative purposes the value of railroad property must be ascertained as long as other property is taxed. Taxes on gross earnings also fail to consider net earnings, capitalization, indebtedness, losses, and other important factors.

So-called ad valorem taxes, which are only modifications of the general property tax, have been employed in many states as a means of escaping the undesirable features of the general property or gross earnings taxes. However, ad valorem taxes necessitate the valuation of railroad property, a costly and arduous undertaking. Unfortunately, state officials may set up an arbitrary rather than a real value, or they may fail to equalize the taxation of railroads and other business. Property cannot be valued without knowing the net earnings of the carriers, thus forcing resort to methods of determining net income, with some expense and difficulty. As gross and net earnings fluctuate from year to year, the value of railroad property, as

[11] For the development of railroad tax history, see Seligman, E. R. A., *Essays in Taxation* (New York: Macmillan Co., 1925), 9th ed.; Jensen, J. P., *Property Taxation in the United States* (Chicago: University of Chicago Press, 1932), chap. xvii; and Glaeser, Martin G., *Outlines of Public Utility Economics* (New York: Macmillan Co., 1927). A perennial discussion of railroad taxation problems will be found in the annual proceedings of the National Tax Association.

measured by its earning capacity, also changes and the value of property for taxation should be adjusted frequently to allow for changes of this sort. The policy of maintaining constant valuations of railroad and other property for taxation may simplify the work of tax officials, but it disregards the dynamic character of transportation and other business.

In some states, including Texas, Rhode Island, Massachusetts, New York, Delaware, and Pennsylvania, the tangible property of railroads is assessed by state officials. In few states there is no central assessment of operating properties or, if a central assessment is undertaken, it covers only a part of these properties. In eight states ex-officio boards, which consist of such officials as the governor, auditor, secretary of state, and treasurer, assess railroad property. This proceeding is undesirable, either because these officials are too busy to appraise the property carefully, or they usually lack an expert knowledge of the value of the property.[12]

The principle of a unit valuation of railroad property has grown in favor among the states, and commonly the property of the entire system, or the part located within a state, is assessed as a unit. In a few states the branch lines and main lines are valued separately, and each class of property, such as tracks and rolling stock, may also be valued separately. Theoretically, the unit rule permits a more accurate valuation of railroad property and a more effective equalization of tax burdens. After the unit value is ascertained, the total valuation may be broken up among the taxing counties and townships. The unit rule sometimes permits unequal taxation because railroad property or traffic may be concentrated in a given area instead of being distributed more or less evenly over the different states in which the railroad operates.[13]

In some states the tax rate for railroad property may be determined by averaging the rates of other state taxes on property. In theory, the rates of railroad taxes must be fixed with reference to the burdens of taxation on other property and on other business in the community, in order that an equalization of tax burdens may be obtained. The equalization processes should be in the hands of skilled state officials and should not be turned over to ex-officio boards appointed for political purposes. Since the property used in other businesses is commonly assessed at less than its true value, the valuation of railroad property should be reduced proportionately or the tax rate should be adjusted. According to Professor Jensen, our state laws seldom prescribe rules for the valuation of railroad property, and tax commissions rarely state their valuation methods, largely because of the desire to avoid litigation over the proper method to be employed.[14]

Apportionment of Taxes

Once the base of railroad taxation is established as property value, gross or net earnings, franchise value, etc., it becomes necessary to apportion the taxable base among the different taxing jurisdictions. The apportionment may involve several states, which in turn further apportion property among the local tax units. The tax may be collected exclusively by the state from the property centrally assessed, or the counties, townships, cities, etc., may share in the collection by imposing a local

[12] See Jensen, *op. cit.*, for an excellent summary of the problems of assessment, equalization, and apportionment.

[13] *Ibid.*, p. 426.

[14] *Ibid.*, p. 429.

tax rate on that part of the railroad apportioned to each unit. Although there are various methods by which railroad property might be apportioned to the taxing jurisdictions, the mileage of the main tracks is the common method, and most states divide the taxable valuation of the railroad in such a manner that the value taxed by the local units depends on the ratio of the mileage of the main track in the locality to the total mileage. This favors the thinly populated areas because of their relative advantages in the mileage enjoyed.

A committee of the National Tax Association studied the possible methods of apportionment and found each more or less defective. Single track mileage ignores terminals and traffic density; all track mileage is more adequate, but it may not coincide with the value of the share of the traffic enjoyed; net earnings in the different taxing jurisdictions are unknown; gross earnings are commonly employed and are important, but such figures for the parts of the railroad system in each state are not obtainable with a sufficient degree of accuracy; car mileage may be used as a rough index but it ignores the nature of the traffic and haul; train mileage is too crude and fails to consider earnings or traffic density; car and locomotive mileage is more satisfactory but inadequate alone; traffic units, considering the number of passengers and tons of freight hauled per mile over the system and in the state may be quite useful but they disregard the character of traffic and hauls; and finally, the physical value of each part of a railroad in each state might be employed, but it is impossible to establish the value of each of these parts with reference to the value of other property as a basis of equalizing taxes, although physical value may be a fair basis of apportionment in combination with other factors. Because any single method of apportionment is inadequate, the committee recommended a composite index of car mileage, all track mileage, physical value, traffic units, and gross earnings, based on five-year averages.[15]

Doubts have been raised by tax authorities concerning the feasibility of the committee's plan of apportionment.[16] In the last analysis valuation and apportionment of railroad property for taxation are matters of judgment and no perfect formula can be devised. Some simple and arbitrary method, such as all track mileage, may possibly serve as well as any other method of apportionment, with wise administration. Wisconsin has used a combination of all track mileage, gross earnings, net earnings, and car mileage with fair success.[17]

Taxes on Earnings

In some states net earnings have served as a basis of taxation, and strong arguments may be presented to urge the wider adoption of such taxation.[18] The fairness of net earnings taxes is appealing, for taxes vary with net earnings. The more extensive use of income taxation in this country and the accounting regulations prescribed for railroads by the Interstate Commerce Commission have made it essential for railroads to keep accurate and comprehensive accounts, and this should prove of benefit to the states desiring to tax net earnings. However, if other industries in a state are taxed on the value of their property, it becomes necessary to value railroad property in order to compare tax burdens

[15] 1923 *Proceedings*, National Tax Association, Report on Taxation of Public Utilities, pp. 407-10.

[16] Lutz, H. L., *Public Finance* (New York: Appleton & Co., 1929), p. 191.

[17] See statement of Thomas E. Lyons, 1922 *Proceedings*, National Tax Association, p. 191.

[18] See Seligman, *op. cit.*, pp. 245-6.

with property valuations. Unfortunately, net income taxes suffer great declines in their yield during depression, as our federal experience indicates.

As a compromise measure to combine the strong features of both gross and net income taxation, a committee of the National Tax Association has recommended a gross-net earnings tax. It is suggested that earnings might be taxed with the provision that, in the event they were very small or absent altogether, a minimum tax would be imposed upon gross earnings. Such a tax would be fair because it would be based primarily on net earnings, but it would protect government revenues in times of reduced net earnings.[19]

The states have experimented with various types and combinations of taxes, now using one tax and later substituting a new tax for the old, or reverting to a still older method of taxation. The conclusion may be drawn that there is no simple and easy scheme of railroad taxation, for every type of tax, if it attempts to impose equitable burdens, is complicated and difficult to administer. The administration of railroad taxes is, perhaps, more important than the method followed, for responsibility for effective taxation rests ultimately upon the officials involved and the judgment they exercise.[20]

Valuation for Taxation and Regulation

The valuation of railroad property is one of the crucial problems in both taxation and rate regulation. The processes of valuation for taxation are quite different from those followed in rate-making, both because of the differences in the methods employed and in the powers and personnel of the rate-making and taxing commissions. However, there are important common factors which must be considered in the two kinds of valuation, although these factors may not be given the same weight in reaching valuations. The Interstate Commerce Commission has declared, in discussing a report on the Kansas City Southern Railway that, "Valuation for capitalization, consolidation, taxation, and rate-making purposes and estimates of exchange value cannot all be made on the same basis."[21]

As a consequence of the decisions of the Interstate Commerce Commission and the courts, it appears that valuation for rate-making rests largely on concepts of costs, as original cost and reproduction cost, although earning capacity and other factors are also important. In the classic case of *Smith* v. *Ames* the Supreme Court declared in 1898:

> "We hold . . . that the basis of all calculations as to the reasonableness of rates to be charged by a corporation maintaining a public highway under legislative sanction must be the fair value of the property being used by it for the convenience of the public. And in order to ascertain that value, the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses are all matters for consideration and are to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property."

There is considerable difference of opinion at the present time as to the proper methods of railroad valuation for rate-making, so that no clear cut formula

[19] See 1922 *Proceedings*, National Tax Association, pp. 161-79.

[20] For a description of present methods of state railroad taxation see the Tax Research Foundation, *Federal and State Tax Systems*, 1932.

[21] For a discussion of the problems of valuation for taxation see Glaeser, *op. cit.*, pp. 594-5; 1922 *Proceedings*, National Tax Association, pp. 170-1; Tunell, "Value for Taxation and Value for Rate-Making", 1927 *Proceedings*, National Tax Association, pp. 263-79; and Bonbright, James C., "May the Same Property Have Different Values for Different Purposes", 1927 *Proceedings*, National Tax Association, pp. 279-89.

seems applicable. The various factors involved in each case, with its more or less peculiar circumstances, must be weighed in the minds of the rate-making commissions and a final judgment rendered.

Valuation for taxation proceeds to establish a fair or true value of railroad property which is primarily, in theory, a commercial or market value, or, as some state laws have defined it, a "cash value." This value, which theoretically depends largely on earnings, may or may not coincide with the rate-making value. Taxing commissions may also consider original costs of construction, depreciation, and other costs. If valuations for taxation were adjusted according to the changing earning power of the railroads, the tax burden would vary in direct proportion with earnings. Actually, tax valuations tend to remain without change for periods of months or years because of a disregard for fluctuations in earnings and because of the administrative problems involved in adjusting tax valuations to earnings. It should be pointed out that property valuations in general, for purposes of taxation, do not vary with constant changes in the earning capacity of property. When railroad property is valued for taxation, its taxable value must be compared with the taxable values of other property in order to equalize the tax burdens on various classes of property. Neither the rate-making value nor the tax value rests on any simple formula and, in the last analysis, both values must depend on the judgment of the commissions setting these values. But in spite of certain differences, valuation for taxation and for regulation of rates cannot be fixed altogether independently. To the extent that taxable value rests on earnings, which in turn depend on rate-making policies, taxable value is conditioned by the valuation for rate-making.

Some of the difference in valuation for rate regulation and taxation may be illustrated by an extreme case cited by a railroad official. A small subsidiary of a western railroad was valued at $540,000 by the Interstate Commerce Commission in 1916. It was operated at a continual loss. In 1923 the tax commissioner assessed the property at $56,400, although the railroad had been trying for two or three years, but without success, to sell the property for $50,000. When the railroad offered to sell the subsidiary to the tax commissioner for $25,000, the value for taxation was finally reduced to that sum. In 1925 the subsidiary was sold for $25,000.[22]

Railroad and Automobile Taxation

In a discussion of current problems of railroad taxation it is desirable to give some thought to the comparative tax burdens of the railroads and their automobile competitors. The taxation of motor vehicles is a huge problem in itself, and only a few general remarks can be made here. It is often said that the railroads pay heavy taxes which are diverted to road construction and maintenance for the benefit of their automobile competitors. While railroads have suffered considerably from automobile competition, they still appear to enjoy advantages in long hauls of freight and passengers. A sound transportation policy, with respect to both regulation and taxation, should be based upon the assumption that both railroads and motor vehicles are necessary transportation agencies. If this assumption is valid, then taxation should not operate to handicap one agency for the benefit of the other.

It may be granted that the automobile

[22] Tunell, *op. cit.*, p. 274.

has enjoyed advantages over the railroad with respect to regulation and taxation in recent years, but the point should not be overlooked that automobile transportation is passing through a transitional stage similar to the early development of the railroad. It may be expected that the present unregulated interstate service of trucks and busses will be ultimately succeeded by federal regulation of rates, service, etc. Such regulation has already been recommended by the Interstate Commerce Commission.[23] The rapid rise of independent automobile competition is partly attributable to failure of the railroads to envisage the opportunities in that field, which they might have exploited more extensively.[24]

Whether the railroads are overtaxed, as compared with trucks and busses, is a matter of acute controversy concerning which adequate information is lacking. The automobile industry and automobile carriers assert that motor vehicles are being taxed off our roads, and that automobile taxation has already reached the danger point. It seems to be a safe conclusion that until recently, at least, commercial automobile transportation has enjoyed a freedom from much of the tax burden laid on railroads. Among the observers of the situation it is probably a common opinion that the railroads suffer from taxation which is relatively more heavy than that on their automobile competitors. A number of competent state tax officials have expressed their judgment to the writer that railroad taxes are excessive when compared with automobile taxes. California has already gone so far as to reduce the tax rate on the gross receipts of short-line steam railroads from 7% to 4.25% and the tax rate on street railways from 5.25% to 4.25%, largely because of automobile competition. In that State a study is now being conducted to determine the present tax burdens of these competing agencies with a view to shedding more light on future taxation policies for steam railroads and their competitors.

Automobile taxes, however, are heavier than many people suppose. Data presented by the American Automobile Association in the federal hearings on the 1932 revenue bill, if taken at their face value, show a continual rise in the total taxation of gasoline and motor vehicles from $233,900,912 in 1922 to $1,025,779,876 in 1931. The tax burden in 1931 consisted of $536,578,086 in gasoline taxes, $344,337,654 in registration fees, and $144,864,136 in personal property taxes. The average tax per motor vehicle has increased from $19.11 in 1922 to $39.74 in 1931. Total automobile taxes in 1931 accounted for about 10% of total federal, state, and local taxes. It should be emphasized that these data refer to automobiles of all types, including the popular private passenger car, and that they fail to show the relations of taxation to taxable capacity.[25]

The gasoline tax has had a remarkable history. Not known until recently, it was soon adopted in all the states, in a number of cities, and by the Federal Government. State tax rates range from 2 to 7 cents a gallon. The 1932 federal tax is a cent a gallon and is to produce estimated annual revenues of $150,000,000. The history of the gasoline tax has shown a constant tendency toward higher rates and revenue yield.

While automobile transportation has been paying huge taxes, it has secured

[23] I. C. C., 45th *Annual Report*, 1931, p. 120.

[24] Cf. H. R. Trumbower, "Regulation of the Common Carrier", 19 *American Economic Review, Supplement*, 226-35 (1929).

[25] See Senate Finance Committee, Hearings on H. R. 10,236 (1932), pp. 1004-1017; and House Committee on Ways and Means, Hearings on H. R. 10,236, pp. 751-919.

the services of public highways without the necessity of building and maintaining its own roadbeds. What it has cost the public to provide these roadbeds is unknown, for our highways have been used by private and commercial vehicles without distinction. Total highway expenditures of all sorts amount to about two billion dollars annually, as compared with total automobile taxation of about one billion dollars. An extensive study of motor vehicle taxation by Professor J. W. Martin indicates that total expenditures for rural roads in 1929 were $1,444,669,000, which were covered by gasoline and motor vehicle taxes accounting for 53.9% of the total, federal aid amounting to 5.4%, and general taxes and bond issues equalling 40.7%. Of the $552,161,000 spent on highways in cities over 30,000 in population in 1927, $227,513,000 was derived from special assessments, $25,792,000 from charges for highway privileges, and the remainder from bonds and general tax revenues. Highway bonds are frequently paid off with revenues from the gasoline tax and motor vehicle taxation. While these estimates are more or less rough, they are of some value in considering the problems of automobile competition.[26]

Automobile taxes are increasing steadily at a rate that promises, unless it is checked, to remove much or all of the advantage commercial motor vehicles may enjoy as a result of a favorable tax position. The manufacturers' sales taxes in the 1932 federal revenue law, amounting to 3% on passenger automobiles, 2% on trucks, 2% on parts and accessories, $.0225 a pound on tires, and $.04 a pound on tubes, will yield an estimated sum of $75,000,000 annually, thus placing further tax charges on automobile transportation. However, the trend toward heavier gasoline and automobile taxes is being resisted bitterly by motorists, commercial carriers, gasoline distributors and refiners, automobile manufacturers, and other interests. In spite of much argument to the contrary, it seems just as logical to tax the automobile industry for general revenue purposes as it does to tax tobacco, real estate, stocks and bonds, and numerous other objects. However, until the automobile industry is taxed approximately to the limit where its taxes tend to equal its full share of the costs of road construction and maintenance, it seems reasonable that these taxes should not be diverted from road funds.

Unfortunately, the data at hand concerning the relative tax burdens of railroads and automobile transport are incomplete and inconclusive.[27] The lack

[26] J. W. Martin, reporting for the Committee on Taxation of Motor Transportation, 1930 *Proceedings*, National Tax Association, pp. 135-67.

[27] Commissioner Eastman of the I. C. C. has wisely refrained from expressing a final conclusion on the problem. (J. B. Eastman, "Transportation by Rail and Otherwise", 22 *American Economic Review, Supplement* 254 (1932).) Attorney-Examiner Flynn of the I. C. C. likewise finds that it is as yet impossible to ascertain the facts of the situation. (Leo J. Flynn, proposed report to the I. C. C. on Docket No. 23,400.) A study by T. H. MacDonald of conditions in Connecticut leads him to the conclusion that commercial motor vehicles are paying more for highway service in that State than the railroads do for roadbeds, and that these vehicles are not subsidized to the detriment of other common carriers. (T. H. MacDonald, "Commercial Vehicles on Free Highways", 1 *Journal of Land & Public Utility Economics* 385-97 (1925).) An examination of automobile taxation and highway costs in Minnesota by Professor Roy G. Blakey indicates that the costs of the state trunk highway system are being met by charges on motor vehicles, but that 87% of the cost of maintenance of the local highway system is being paid out of property taxes. A comparison of railroad and other property taxation in that State showed that the 4% tax on the gross earnings of railroads would have to be raised to 5.74% in order to place the railroads on an equality with other property. (Roy G. Blakey, *Taxation in Minnesota* (Minneapolis: University of Minnesota Press, 1932), chaps. 11 and 13.) The National Association of Motor Bus Operators has presented figures purporting to show that in 1930 the common carrier motor bus paid 7.2% of its gross receipts in taxes, as compared with 4.5% paid by all other public utilities, and 8.9%

(Footnote 27 continued on page 85)

of scientific studies emphasizes the immediate necessity for a probing of the situation by such agencies as the Interstate Commerce Commission, and that body has already recommended such an investigation to Congress.[28] Some of the states are already conducting investigations or are planning them. The whole situation is gravely complicated by the use of the highways by automobiles for personal and business use and the present uncertainty concerning the proper share of taxes for each use.

It is extremely difficult to compare the relative tax burdens of the railroads on the one hand, and of commercial automobiles on the other. Some automobiles are used for private business and some are used partly for business and partly for pleasure. The taxation of railroads and automobiles might be compared with reference to gross earnings, net earnings, property investments, the costs of building and maintaining roadbeds, etc. No one base is adequate. The tax burdens of the agencies of transportation might also be compared with the tax burdens of other property or business enterprise. The complaint of the railroads that they are excessively taxed is also voiced by real estate interests the country over. The tax charges levied on the railroads are probably not unfair, generally speaking, as compared with tax charges on other property.

There is no agreement among the states, unfortunately, concerning the proper relation of automobile taxation and highway costs, yet the relationship is of great importance in the taxation of the automobile as compared with the taxation of the railroad. Three groups, at least, share in the costs and benefits of the highways: users of the highways, property owners whose property either increases or decreases in value because of the highways, and the public. It is still to be decided what part of the total highway costs each group must bear. It would seem to be logical that use of the highways for business purposes, at least, should be met fully by taxation against motor vehicles used for business. This taxation should cover the additional costs involved in building and maintaining highways for business uses. The measurement of such costs, obviously, is a very complicated and difficult problem. It would probably necessitate a classification of motor vehicles using the highways, as well as a classification of highways according to the uses made of them. It also involves determination of the proper weight to be given each factor of importance in automobile taxation, such as the amount of gasoline consumed, weight of the vehicle, the mileage it covers, etc.

The first requisite in handling the railroad and automobile tax situation is a clear cut statement of fundamental policy. Assuming the railroads and other transportation agencies to be both necessary and largely supplementary, tax burdens should be equitably distributed

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(Footnote 27 continued from page 84)

of its property investment, as compared with 1.5% paid by the railroads. (House Committee on Ways and Means, *op. cit.*, pp. 799-800.) The American Motorists' Association offers data to show that in 1931 the registered motor vehicles of the country paid taxes amounting to approximately 19% of their value. (Senate Finance Committee, *op. cit.*, p. 1002.) Professor Stuart Daggett suggests that motor vehicles may be adequately taxed for the most part and outlines a plan of study for the problem. (Stuart Daggett, "Our Changing Transportation System", 22 *American Economic Review, Supplement* 264-5 (1932). (Professor M. H. Hunter would employ taxation to equalize competition between the railroads and motor vehicles, and believes such a policy would justify a very material increase in automobile taxation. (M. H. Hunter, Report on Taxation of Motor Vehicle Transportation, 1929 *Proceedings*, National Tax Association, pp. 474-85.) All these conclusions indicate an embarrassing lack of facts as a basis for dealing with the problems involved and show the general disagreement that now exists.

[28] I. C. C., 45th *Annual Report*, 1931, p. 120.

without altering the economic basis of competition. Neither the railroad nor the automobile should be subsidized to the disadvantage of the other. It must be admitted that present taxes are collected without full information concernin the comparative tax charges of these two agencies, the effects of such taxation, and the definite principles that should be followed. Until basic tax policies are clearly worked out and tax systems are revised according to those policies, the uniform and equitable taxation of the railroad and the automobile is purely a matter of chance.

The Incidence of Railroad Taxes

A general principle in the rate-making practices of the Interstate Commerce Commission and state public utilities commissions appears to treat taxes as a cost of railroading. If regulating commissions adjust rates to cover taxes, then there is a tendency for taxes to be shifted to the public using the railroads. As a long-run proposition, costs of railroad operation, including taxes, must be included in earnings, or the railroads will have to be abandoned or taken over by the government. If regulating commissions fix rates so low as to prohibit the shifting of taxes, earnings decline and investors are encouraged to withdraw their funds and invest them where the returns are higher, or new funds are diverted to other industries. If we accept the premise that railroad facilities are necessary, in a given case, then rates must be sufficiently high to permit a return on investment which will compare favorably with returns in other fields.

It is a commonly accepted principle in taxation that a corporation net income tax cannot be shifted, as a general proposition, but there may be good reasons for drawing a different conclusion with reference to railroads. Charges to the account of railway tax accruals are deducted from operating revenues by the Interstate Commerce Commission before arriving at operating income. Income and other taxes are charged to that account if they relate to railway operations, privileges, and property. In decisions handed down by the Supreme Court on the Galveston Electric Company[29] and the Georgia Railway and Power Company[30] the principle was enunciated that the federal corporation income tax must be allowed as an operating expense and be deducted from gross income; but the fact that shareholders of taxed corporations do not pay the normal tax on dividends received should be considered in setting reasonable rates of return.[31] The effect of this interpretation appears to be that a major part of the federal corporation income tax may be shifted.

According to a recent study of the National Industrial Conference Board, these cases did not determine whether regulating commissions may set rates permitting public service corporations to shift this tax. In practice, wide discretion is allowed by the courts in establishing rates that may or may not permit tax shifting.[32] The valuation of railroads for rate-making allows an opportunity to set rates that will sanction a return on the investment comparable to returns in other industries. The following statement of policy of the Interstate Commerce Commission in 1922 is of interest here:

"In our view railroad corporations should, like other corporations, pay their federal

[29] 258 U. S. 388 (1921).

[30] 262 U. S. 625 (1923).

[31] For a discussion of these decisions, see National Industrial Conference Board, *Shifting and Effects of Federal Corporation Income Tax*, 1930, vol. II, p. 78.

[32] *Ibid*, p. 79.

income taxes out of their income, rather than collect it, in effect, from the public in the form of transportation charges adjusted to enable it to retain the designated fair return over and above the tax. We may observe that a fair return of 5.75 per cent, representing an aggregate annual net railway operating income arrived at after deducting, among other things, the federal income tax on a return of 6 per cent, would be approximately the equivalent of a fair return of 6 per cent, out of which the federal income tax was payable."[33]

If it may be assumed, for the sake of this discussion, that government rate regulation intends that taxes shall be shifted, along with other costs, to the users of railroad service, it is still a question if taxes can be shifted. Governments may set rates, but neither governmental agencies nor the railroads can force the public to patronize the railroads when other alternatives are available. As long as shippers may hire automobile trucks, farmers may let their produce stand, and consumers may refuse to buy transported goods, the railroads are more or less at the mercy of their public.

Railroading, as everyone knows, is an industry of heavy fixed costs, and rates not covering unit costs of operation may yield larger revenues than higher rates. To remain in business, the railroads must move passengers and freight, and rates that invite traffic, as a temporary proposition at least, may not be high enough to permit shifting taxes and all other costs. A small loss is preferable to a large loss. The shifting of railroad taxes depends upon the possibility of reinvesting capital and labor, the demand for transportation service, the rates of competing agencies, general business conditions, governmental rate policies, etc. As in other industries, taxes may be shifted more easily during prosperity than during depression, when many commodities and services can be sold only at prices below cost.

Railroading is not a freely competitive industry where rates fluctuate with changing supply and demand conditions, but the full shifting of taxes depends upon the adjustment of prices to cover costs. Rates, once they are fixed, tend to remain at that level, in spite of protests against such a policy. Taxes, however, may change in the meantime. Obviously, rising taxes cannot be shifted unless railroad rates rise accordingly. When taxes prove to be excessive, they may theoretically be lowered by legislative or administrative bodies by reducing tax rates, property valuations, etc. But here again such changes work out slowly and prevent perfect tax shifting. If a railroad is in the unfortunate situation of being unnecessary in a given area, it represents a sunk investment, and it cannot hope to collect taxes and other costs from the public. It may be the intention of rate-making commissions to allow tax shifting in the long run, but there are many obstacles to the process in the short run. The practical conclusion we are forced to draw is that, while taxes on railroads tend to be shifted, there are many important exceptions to the general tendency, and taxes cannot be fully shifted in every case.

Reforms in Railroad Taxation

Reforms in railroad taxation have been effected only slowly through the years. As H. C. Adams said 30 years ago, we may say today, "No one who has familiarized himself with the situation can avoid the conclusion that reform in railroad taxation lies in the direction of the substitution of simplicity for complexity, of an harmonious system of

[33] I. C. C., Reduced Rates, 68 I. C. C. 683 (1922).

legislation for conflicting laws."[34] Today, as during the past 40 or 50 years, there exists a need for greater uniformity in order to remove inequalities of assessment, equalization, apportionment, and administration.

Reforms in railroad taxation should be worked out on the policy of attaining more efficient administration and of realizing a more perfect equality of tax burdens with respect to the railroads and their competitors. Automobile taxation is still in the experimental stage, and until more definite steps are taken toward dealing with its problems, the burdens of taxation on the automobile and the railroad cannot be distributed with comparative equity. Automobile competition, taxation, and subsidization should be carefully studied by expert and unbiased boards both to formulate fundamental policies and to obtain the facts of the situation. The basic conditions of transportation should not be interfered with by taxation, and, in so far as this is possible, taxes should be imposed upon the railroads and the automobile without altering the basis of competition.

With changing economic conditions, involving swings from prosperity to depression, frequent adjustments should be made in railroad property valuations in order that property and other taxes should be collected with reference to real and not ficticious values. The procedure of assessment, equalization, and apportionment should be in the hands of expert state commissions instead of being turned over to ex-officio boards or local officials, with all their weaknesses. It would probably be wise to place more emphasis on net earnings as a tax base, with the hope of securing a more accurate measure of taxable capacity. In the event that the recapture clause of the Transportation Act of 1920 is abolished, additional argument will be advanced for net income taxation, for then the stronger railroads will enjoy their full net earnings; the net earnings of each railroad will indicate the taxes it can pay.

The complications involved in railroad taxation may eventually force the country to consider the feasibility of relatively uniform federal taxation to parallel federal regulation of interstate railroad and motor vehicle transportaion. All transportation taxes might be collected by the Federal Government on the basis of net income and be redistributed to the states according to the proportion of the earnings enjoyed within each state in combination with other factors of importance. It would be very difficult to determine a satisfactory basis of allocating tax collection to the states and to meet all the objections that would be raised to such policy. The Federal Government could probably handle the problems of assessment more effectively than the states, but it is questionable if it could deal as satisfactorily with the problems of equalization and apportionment. There are some thoughtful students of taxation who see important advantages in federal taxation of certain revenue sources, with a subsequent distribution of tax collections among the various states. However, such reforms in railroad taxation as are imminent will necessarily be worked out among the states, for their taxing powers are in no immediate danger of being withdrawn.[35]

[34] I. C. C., *Railways in the United States in 1902*, part v, State Taxation of Railways, p. 9. Also see A. E. Holcomb, "The Assessment of Public Service Corporations", 1911 *Proceedings*, National Tax Association 149-92.

[35] Cf. S. T. Howe, "The Central Control of the Valuation of Taxable Subjects", 58 *Annals of the American Academy* 119; and Jensen, *op. cit.*, p. 416.

Summaries of Research

The Behavior of Utility Prices

REDUCTION of public utility rates has of late become increasingly a matter of public interest and of concern to companies and commissions. Business depression with its attending unemployment, wage reductions, decreased budgets for consumption, decreased profits, and decreased prices for products sold, has awakened in many sections of the country rather insistent demands on the part of consumers for reductions in the price of public utility services. The well recognized and now clearly illustrated stability of utility rates in the face of quite general, rapid, and significant reductions in other prices has added fuel to the argument. Likewise, the relatively good earnings record established by public utility companies, particularly in the early part of the depression, has been in decided contrast to the records of railroads and most industrial companies. This record, while a matter of pride to the companies in their financial publicity, has, nevertheless, stimulated the demand that the utility companies should be forced to share a greater part of the current burden in view of the monopolistic character of their services in a considerable part of their present market.

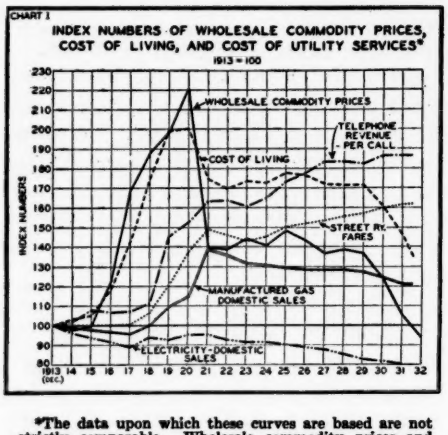
The development of guiding principles for settling so complex a regulatory-financial problem involves the broadest survey of long-run economic, financial, and regulatory principles, and is not attempted in this short note. In the current discussion of rate reductions one question seems important to a clearer appreciation of the problem: How great is the disparity between the movements of utility and other prices? In other words, how significant has been the decline in general prices and how inflexible have utility rates remained? This summary presents some material bearing upon this question.

Charts I and II present index numbers of prices of domestic electricity, domestic manufactured gas, telephone service, and street railway transportation. These indexes of the prices of utility services are compared with the index numbers of two other price series: the index number of wholesale commodity prices and the index number of the cost of living.[1] The index of wholesale prices was selected as representative of price movements which are very susceptible to price-determining factors, and, consequently, this index moves sooner and more widely than prices of other classes of commodities, such as retail goods. The consumer of utility service is interested in knowing how much cost of living in general has declined relative to utility rates. To answer this question the index of cost of living is included.

[1] *Sources:* Index of wholesale prices (monthly); cost of living (June-December), domestic electric sales (June-December), domestic manufactured gas sales (June-December)—all from the United States Department of Labor, Bureau of Labor Statistics; index of street railway fares (average of monthly indexes), from *Transit Journal*, computed by Mr. Albert S. Richey; index of telephone revenue per call, compiled by Professor James C. Bonbright.

The price series used are not free from objection as to their accuracy and representative character, since in many cases the price series are based on certain assumptions, such as average consumption or size of house in the case of electricity and average number of calls in the case of telephone service. But, if such inaccuracies are recognized, the series may be safely used for the discovery of trends or movements, which is the purpose of this discussion.

Chart I shows a comparison of these index numbers with the pre-war year 1913 as the base (100). In general, for wholesale commodity prices and the cost of living, three major price movements are indicated. The *first* is the period of great price increases and declines during the war and post-war years.

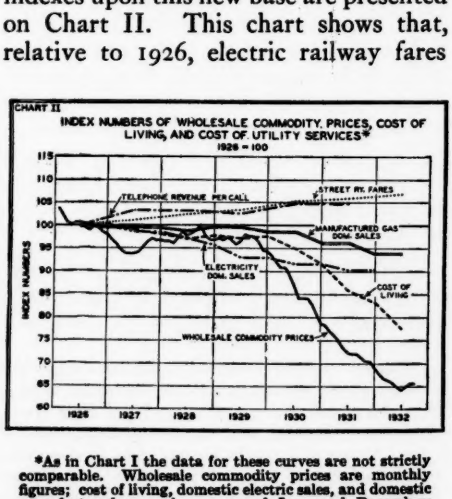


*The data upon which these curves are based are not strictly comparable. Wholesale commodity prices and street railway fares are represented by an average of monthly data; cost of living, domestic electric sales, and domestic manufactured gas sales by December figures; and telephone revenues by annual figures.

The great increase in wholesale commodity prices and cost of living occurred roughly from 1916 through 1920. Thus wholesale prices during 1920 averaged 2.2 times what they were in 1913 and cost of living was about double the earlier figure. The rapid post-war decline occurred in 1921, and was much more significant in wholesale prices than in cost of living. The *second* period from 1922 to 1929 is the interval of relative price stability. Little significant change in either wholesale prices or cost of living occurred during this time. The *third* period is the period of declining prices characteristic of the last three years, a decline which in June, 1932 brought wholesale prices almost 10% below their 1913 level.

During this entire period the prices of utility services have diverged considerably in movement from these two bases. For example, in 1920 when wholesale commodity prices averaged 2.2 times 1913 prices and cost of living about 2 times, domestic electric prices were 5% under the 1913 level, gas rates were 15% higher, street railway fares 37% above, and telephone revenue per call about 53% above the 1913 basis. Again in 1921, while wholesale prices and cost of living were falling sharply, electric rates remained constant, while all other indexes of utility prices increased. In the second period, during which little change occurred in wholesale prices or cost of living, the indexes of electricity and gas prices declined, while those of street railway fares and telephone revenues per call increased. The diversity in price movement is illustrated anew in the last three years.

In order to have a better picture of the extent of price distortion during the recent period, the index numbers have been recomputed, using as a base the figures for the year 1926 as 100. The indexes upon this new base are presented on Chart II. This chart shows that, relative to 1926, electric railway fares



*As in Chart I the data for these curves are not strictly comparable. Wholesale commodity prices are monthly figures; cost of living, domestic electric sales, and domestic manufactured gas sales are as of June and December; street railway fares are 12-months' averages; and telephone revenues are annual figures.

have increased, telephone revenue per call has increased, gas has declined slightly, electricity has declined more significantly, cost of living has decreased still more, and wholesale prices have shown the greatest decline. The extent of the decline (using 1926 as 100) is shown in Table I.

TABLE I. PERCENTAGES OF DECREASE IN INDEXES OF PRICES.

Class of Commodity	Percentage Decrease*	Date of Price Used
Street railway fares	(7.0)%	11 months, 1932
Telephone revenue per call	(4.9)	Year 1931
Domestic manufactured gas	6.1	June, 1932
Domestic electricity	9.7	December, 1931
Cost of living	22.5	June, 1932
Wholesale commodity prices	26.1	November, 1932

*Parentheses indicate *increases*.

Summary and Conclusions

1. Failure of utility prices to conform to general price movements is not characteristic of the present depression alone, but has been true for the last 20 years at least, and also for almost every major price movement within that period. In some cases utility prices have moved counter to the general trend; in other cases they have followed the general movement but neither as rapidly nor as significantly.

2. There is considerable difference between the movements of the index numbers of prices in the various public utility industries. Generalization on the movement of utility rates is therefore dangerous and should be qualified.

3. Index numbers are peculiarly susceptible to statistical variation, not to say statistical abuse. The indexes used, except for street railway fares and telephone rates, are Bureau of Labor Statistics figures. These index numbers may differ from those presented by other analysts because of differences in the cities selected as the basis of test, the consumption or the rate schedule used, the method of weighting, the base year, etc.

4. Whether utility rates, in general, or data for a particular industry, are too high is not ascertainable by an analysis such as this alone, for the relative position of the index of utility prices compared with other prices depends very largely upon the year selected as a basis for comparison. For example, on the basis of 1913 figures electric prices showed a considerably greater decline (through 1931) than did wholesale commodity prices. But, if 1926 be selected as a base, then wholesale commodity prices have declined much more significantly. What period represents a "normal" relationship between utility and other prices must be determined by extensive analysis of conditions in the industries.

5. An industry may show an increase in prices and yet not, perhaps, justify a rate reduction. The street railways may be cited as an example. Nor are price comparisons alone, assuming statistical accuracy and comparability, the test of reasonableness. The characteristics of the industry, its financial condition, past regulatory principles and results are other factors to be considered.

6. Distortion of utility prices relative to other prices is significant at the present time. The amount and prevalence of this distortion suggests the desirability of greater attention than has been given to date to the question of whether, in the light of all factors, the continuance of such distortion is in the public interest.

ROY L. REIERSON

Comments on Legislation and Court Decisions

Further Discussion of the Los Angeles Gas and Electric Case

IN the *Journal of Land & Public Utility Economics*, August, 1932, there appeared an article entitled, "A Federal Court Speaks on Valuation and Rate of Return," by Joseph C. Swidler.[1] This discussion dealt with a decision of the California Railroad Commission in *Re Los Angeles Gas and Electric Corporation*,[2] and the subsequent decision of the district court on appeal by the Company from the Commission's findings. In his analysis the writer said:

"The meaning of this [quoted] passage is not perfectly clear on its face. One possible construction is that the cost of money is a proper consideration in fixing the rate of return only when the fair value or reproduction cost rate-base is used, and not when the base is investment cost. *This construction is belied by the Commission's record in other cases where an investment cost base was used, and changing money costs were given great weight in fixing the return.*"[3]

This quotation seems to indicate that the writer believes that the California Commission, in fixing the fair rate of return, has given very careful consideration to the costs of raising capital, and presumably, therefore, to the financial structure of the utility in question. As a matter of fact, this does not seem to have been the case, and one of the criticisms that can be leveled against the regulatory policy of the California Railroad Commission is that it has failed to correlate the return with financial requirements.[4] "As a matter of fact, it has been more concerned with setting a rather definite *per centum* return than in ascertaining the revenue requirements. Moreover, the per centum return has become largely a matter of precedent and today cases of fifteen years ago are cited as authority for fixing a certain rate. It is true that no definite rate applies to all utilities and some attention is paid to *average* cost of money for a given concern, but, except where unusual conditions prevail, seven to eight per cent is considered reasonable. Furthermore, these percentages have come to receive the sanction of being more or less absolutely fair."[5]

Finally, the cases cited do not seem to lend support to the contention that changing money costs are given great weight by the authorities. In *Re Southern California Gas Co., et al*,[6] the following remarks constitute the only analysis to be found in the opinion relative to the rate of return:

"It is apparent that a return of 8.33 per cent is excessive.

"In view of the marked decline in the cost of money to large utilities during the past few years, this Commission has held, in a number of instances, that a return of 7½ per cent upon capital invested is reasonable for the larger utilities operating in California. This particular utility being a distributing agent, and incurring no exceptional hazard,

[1] Vol. VIII, pp. 323-7 (August, 1932).

[2] 35 Cal. R. C. R. 443 (1930).

[3] Swidler, *op. cit.*, at 326; italics mine. Cases cited: *California Farm Bureau Fed. v. San Joaquin L. & P. Corp.*, 36 Cal. R. C. R. 141, 146 (1931), and *In re Southern California Gas Co.*, 32 Cal. R. C. R. 379, 386 (1928).

[4] See *Re Coast Counties Gas and Electric Company*, 24 Cal. R. C. R. 69, 75 (1923).

[5] Pegrum, D. F., *Rate Theories and the California Railroad Commission* (Berkeley: University of California Press, 1932), p. 144.

[6] 32 Cal. R. C. R. 379, 386 (1928).

we can find no justification for granting a return in excess of 7½ per cent, and, therefore, conclude that such a return is reasonable."[7]

In *California Farm Bureau Federation* v. *San Joaquin Light and Power Corporation*,[8] the problem of rates, and therefore of the revenues of the Company, was particularly acute because of the distress of the agricultural regions and towns served by this utility. Consequently, the Commission regarded this hearing as of an emergency nature, and the solution adopted was designed to meet the emergency. "Indeed, the distress conditions of the San Joaquin Valley as portrayed at the hearings is [sic] such as to impel that measure of expeditious and helpful action here as may be had, consistent with the rights of the two companies affected."[9]

The Company argued for a rate of return from 8 to 8½%. The Commission considered this an excessive return in the light of economic conditions and also in view of the fact that the Company's bonds were selling on a yield basis of less than 5%, and the preferred stock about 6%. Consequently, the Commission set the return at $5,130,000, although it did not state what per centum return this amounted to, nor did it state what the exact rate-base was. Apparently, however, the return was about 7½%. As an explanation of the adequacy of this return the Commission then proceeded to point out that there would be revenue sufficient to cover all fixed financial requirements and at least 11% on any common stock money invested in the properties as well. It is important to note, however, that the remarks were submitted as demonstration of the fact that the return allowed was adequate and not as a means of calculating the revenue requirements.

Finally, it should be noted that the rates granted were emergency ones and therefore the considerations given to the various elements in the case cannot be taken as reflecting the established policy of the Commission, or as establishing a new policy.[10] That the Commission regarded the situation as an emergency is indicated by the following quotation:

"Such an interim reduction of rates is one to which the companies should have no just or legal ground for complaint and, while perhaps representing the maximum which this Commission is justified in ordering under the record here made, might well, as a matter of company policy be increased in view of the distressed condition of the companies' territory and consumers, for the utilities may, of course, do voluntarily that which the Commission may not order them to do."[11]

The weight of evidence regarding the policy of fixing the fair return in California justifies the conclusion then, that practically no consideration is given to the financing of the particular utility involved.

D. F. PEGRUM

[7] The above remarks applied to the Los Angeles Gas and Electric Corporation only.

[8] *Supra*, n. 3.

[9] *Ibid.*, at 144.

[10] For other cases in which rates were adjusted to meet economic conditions see: *Re Citrus Belt Gas Co.*, 14 Cal. R. C. R. 141 (1917); *Pacific Grove v. Coast Valley Gas & Electric Co.*, 14 Cal. R. C. R. 460 (1917); *Re San Joaquin L. & P. Corp.*, 17 Cal. R. C. R. 940 (1920); *Re Southern California Edison Co.*, 25 Cal. R. C R. 461 (1924) and 25 Cal. R. C. R. 475 (1924).

[11] *California Farm Bureau Fed. v. San Joaquin L. & P. Corp.*, *supra*, n. 3 at 147.

Mr. Swidler's Reply

PROFESSOR Pegrum does not distinguish between two separate factors in fixing the rate of return: (1) the cost of money and financial requirements of a given utility and (2) changes in the cost of money generally.

The weights to be given to the financial requirements of a utility and to changes in money costs generally are separate problems involving different considerations. Thus, it may be that the cost of money to a particular utility will increase, although during the same period the cost of money generally declines. It was not my intention, in the passage which Professor Pegrum criticizes, to discuss the attitude of the California Railroad Commission on the first factor, the weight to be accorded the financial requirements of particular utilities, but rather its position with regard to the effect of general changes in the cost of money on rate of return. I was particularly interested in determining whether the Commission considered changes in money costs to be related to rate of return in the same way that changes in commodity costs were related to reproduction-cost valuations, so that the rate of return would fluctuate with changes in the cost of money whether or not reflected in the companies' actual capitalization, just as reproduction costs fluctuate with changes in commodity costs regardless of actual investment.

I cannot agree that the cases fail to support my conclusion on the problem to which I addressed myself. The passage which Professor Pegrum quotes from the Southern California Gas case seems to me to show clearly that the Commission gave great weight to changing money costs. A reading of *California Farm Bureau Federation* v. *San Joaquin Light & Power Corporation*[1] shows that here too the Commission gave serious consideration to such costs, as well as to the actual financing and requirements of the utility. The fact that the Commission's discussion of this factor took the form of a justification of its ruling (made in the same case) does not vitiate its force; a great deal of authoritative judicial precedent takes this form. I do not think it follows that, because the Commission did not base its decision explicitly on this factor, which was discussed at length, changing costs of money did not affect the result. Nor does the fact that the rates fixed were emergency ones mean that the Commission's rulings in the case reflect its established policy less than do its rulings in other cases. Even emergency rates must yield a fair return,[2] and the cost of money would hardly seem to affect the fairness of the return less in emergency than in other rate cases.

So far as the second problem is concerned, I am likewise unable to agree that the financial requirements of utilities have been totally disregarded by the Commission in rate-making. Of course, the Commission has fixed returns in terms of flat percentages of the rate-base, but so has very nearly every other commission in the country.[3] Indeed, it may be that this is the only constitutional standard, and in view of the doubtful validity of fixing rates by reference to any other, a flat over-all percentage return can certainly of itself carry no implication that financial requirements were not considered in fixing the return. The Farm Bureau case, dis-

[1] 36 Cal. R. C. R. 141 (1931).

[2] *Indiana General Service Company v. McCardle*, U. S. P. C. (Ind.), July 19, 1932.

[3] The Massachusetts Department of Public Utilities is, I believe, the only exception. The traditional Massachusetts method of stating the return in terms of "approved capital liabilities" has never been judicially approved.

[4] *In re Southern Cal. Edison Company*, No. 12718 (1923), 23 Cal. R. C. R. 981, 1009; *In Re San Joaquin Light & Power Co.*, No. 10348 (1922), 21 Cal. R. C. R. 545, 572; *Hopper v. Lassen Electric Company*, No. 25114 (1932), 37 Cal. R. C. R. 830, 836, 837. In the Hopper case the Commission refused to give any consideration to a hypothetical capital structure, and insisted on basing its return on actual financial require-

(Footnote 4 continued on page 95)

cussed by Professor Pegrum, as well as other cases,[4] shows that the Commission has not ignored this factor, but it may very well be that it has not been given sufficient weight in every case.

JOSEPH C. SWIDLER

(*Footnote 4 continued from page 94*)

ments. It said that the use "of fanciful financial assumptions, entirely divorced from actualities, cannot form the basis of a sound conclusion with respect to reasonable rate of return." See also the later opinion of the Commission in *California Farm Bureau Fed. v. San Joaquin Light & Power Corp.*, No. 24809 (1932), 37 Cal. R. C. R. 530.

In Defense of George B. Ford's *Building Height, Bulk and Form*

THE review in the *Journal* by Mr. Graham Aldis of the posthumous book of Mr. George B. Ford, *Building Height, Bulk and Form*[1] brings up several points of interest which could be discussed further.

Mr. Aldis, in questioning why Mr. Ford did not hint that speculative projects were based on unsound financing and valuations, seems to have overlooked the fact that the data upon which Mr. Ford's report was framed were collected on a confidential basis and a pledge made that no building would be mentioned by name or indicated by publication of any readily distinguished characteristics. Consideration of this alone would have restrained Mr. Ford from any specific indictments had he been so minded. However, Mr. Ford did more than hint of inflation and unsoundness.

In this regard, on page 98 of Mr. Ford's text, under the caption, "Land Value," it is more than hinted that many land values in many places are inflated (1929), and further in discussion on page 24 of the same it is remarked, as an explanation of graph No. 8, that in the particular anonymous city in question the total office space vacancy then existing (1929) substantially equalled the new office space constructed in the preceding five years. As an assistant to Mr. Ford in this study and one who worked on the manuscript after his death, I believe it in order to point out that Mr. Ford was well aware that all was not as it should have been in the building and construction industry. However, Mr. Ford had no intention of assuming the role of an economic brother to Cassandra.

Mr. Aldis points out the advisability of use of the so-called "efficiency ratios" —to wit, the relationship between volume of building erected and the net rentable area developed therein. While it cannot be denied that the "efficiency ratio" is a valuable criterion, it is by no means the only one which should be set up and used as a test of good building planning. In my limited experience I have found that in many cases undue reliance on the "efficiency ratio" is a complete illusion and a thing which can lead to error or at least loss of possible opportunity in building planning. For instance, it is found that if the depths of the units[2] are increased in any given plan,

[1] Vol. VIII, p. 331 (August, 1932).

[2] Depth of office space units refers here to the distance from the window, or the wall at the window, to the corridor. When depth may be taken two ways, as, for instance, in a corner suite not yet partitioned, usually the depth is considered as the minimum distance axial with the direction of light entering the windows. In such cases, with light possibly coming in two or three ways, it would be improper to consider such a space as having the longest dimension as the depth, since it is always possible, and in fact usual, so to divide the unit that this longest dimension is or may be the width of two or more office units.

the amount of service areas (corridors, elevator hatches, etc.) is not greatly increased thereby. However, the amount of net rentable area (but not its quality or rental value) is increased by this process. The final result may often be that the cubical volume of the structure will not be increased proportionately with the amount of net rentable area developed, and hence the type of plan outlined will show a higher "efficiency ratio" than the plan with the more shallow offices.

Full analysis of the economic merit of the two types of plans discussed may frequently disclose that, although the total net rentable area is increased more rapidly than the building bulk or "cubage," nevertheless (because of the lower average rental rates obtainable for deep and hence darker space)[3] the net resultant income, after all charges have been met, is not increased commensurate with the building costs and hence with the investment required. Along this line of reasoning it can be frequently concluded that a given type of plan, despite the fact that it may have an admirable "efficiency ratio," may be advantageously discarded in favor of another plan with a lower "efficiency ratio" but which embodies the production and development of better quality, well lighted space, better adapted to the particular market for which the building is being designed.[4] It is possible in this way that a building may be designed with a smaller bulk or volume and that this building form can have greater possibilities of return on the investment. Lest this principle be considered visionary, let it be stated that it has received the endorsement of practical men and, in fact, it is not only preached, but has already been practiced to advantage in a number of cases.

With these general principles in view, Mr. Ford prepared the isometric drawings of typical building "envelopes" on pages 164 to 179 of his text. These illustrate the general form of buildings which his studies led him to suggest as desirable, and building forms which might well be permitted under amended zoning regulations. In general, these forms redistribute building bulk, decreasing the amount in the "base" or lower portions and conceding additional bulk in the "tower," shaft, or upper portions of buildings.

Mr. Aldis in his critique of *Building Height, Bulk and Form* brings up the question as to why the "efficiency ratios" possible under existing zoning ordinances and under Mr. Ford's suggested revisions for ordinances were not investigated. In answer to this it can be pointed out that, if comparative test plans of buildings had been developed as Mr. Aldis suggests, it would have been necessary to have assumed some typical depth of unit (for offices, loft space, or apartments, and the like) and then to have developed conclusions on the relative merit of existing or proposed zoning ordinances. If it were assumed that "efficiency ratios" of the various plans were the only criterion to be studied, some conclusions could be established, but only for the particular unit depth or combinations of depths selected. As soon as these depths were

[3] The relationship here is not necessarily direct. Especially in hand-to-mouth times like the present, peculiar conditions, such as a long lease, or special business advantages, may prevent average rental rates from varying directly with the depth of the space. The conditions which may cause such variations are numberless.

[4] A similar situation may obtain in the subdivision field. If the lots in a given neighborhood are all about 150 feet deep, there is no particular advantage in providing lots 200 feet or more in depth. Such lots at 50-foot frontages will bring very little more in money if 200, than if 150, feet deep, and consequently the price per square foot will often be substantially lower for the deeper than for the shallower lots.

changed, the conclusions thus developed would no longer maintain. To have developed a series of such studies would have been an almost endless task, even if only the various permutations and combinations usually met were investigated and studied. However, for the reasons indicated previously, even such an exhaustive study would not have universal application. To have made a really complete study of the problem with consideration not only of various lot sizes, and various unit depths to meet exigencies of market conditions, but also with varying land values, building costs, rental rates, operating costs, taxes and tax rates, with various plans of financing and a great number of other factors pertinent to the problem and interrelated with each other, would have produced a myriad possible combinations beyond ready estimate.

Indebtedness is due Mr. Aldis for his detection of an error in the tabulation on page 34 of Mr. Ford's text, wherein various salient features of representative zoning ordinances are compared. It is unfortunate that the statement to the effect that "no towers were permitted" under the Chicago ordinance should have crept into this table and that his collaborators did not detect this in the checking of the manuscript after Mr. Ford's death and before publication. Perhaps this, and possibly other inadvertent mistakes as yet undetected, can be overlooked and his study remembered as "a series of soundings," to quote Mr. Ford's own description, in a field as yet not very fully studied in an impartial manner, but a field which his objective and critical analysis has indicated as a fertile one for further investigations. Mr. Ford's untimely death leaves this work to others, but there are many reasons to believe that, if such work is carried on and perfected, the very diametrically opposed points of view often existing between landowners and developers, financiers, sociologists, city planners and zoning law enthusiasts may be united on a more common ground of understanding and cooperation.

A. B. RANDALL.

An Answer by Mr. Aldis

I HAVE no wish to be unduly critical of Professor Ford's fine work nor unduly controversial about Mr. Randall's thorough and scientific approach to the whole problem. If so I seemed, *mea culpa.*

Regarding inflated land valuations, speculative projects, and financing, Mr. Randall can cite a passage mentioning that the amount of vacant office space was increasing rapidly, both relatively and absolutely. But he does not cite the conclusion drawn, which is merely to the effect that "the best [space] is rented first, . . . light, exposure and outlook are at a premium." It would have been far more accurate at least to have put this conclusion the other way, viz., that any space but the best was rapidly becoming marketable only at a discount. But any general economic deduction at this point would have been altogether inconsistent with the tenor of the discussion (pages 94-5) on "Method of Financing"—Mr. Randall's own work, by the way—wherein the bond issue is considered as the fundamental "method of financing" (in contrast to the older type insurance company loan); the "slightly greater risk of the larger issue" is mentioned; and such mortgages are described as "65% of the total appraisal"

without any hint that these "bond-issue appraisals" commonly and notoriously exceeded the actual purchase price of land and cost of building even on an inflated market.

In taking fundamental objection to the authors' whole treatment of the economic and financing aspect of the problem I am not merely luxuriating in hindsight. While it is well known that "leaders" in general business and finance from the highest down continued bullish into 1930, it is just as true that even before 1928 intelligent building managers everywhere were alive to and concerned with the dangers of speculative overbuilding. In the face of the general mania, of the advertising influence of the great bond houses, they could do little publicly, although by private suasion here and there occasional projects were stopped. Moreover, the managers kept silence on the rather ostrich-like grounds that by raising the alarm they would advertise the surplus of space to their tenants. They can be criticized for lack of vigor but not for lack of accurate judgment, to which the authors could easily have had ample access. Cassandra is not an enticing figure but at least she was a better prophetess than Pollyanna.

Mr. Randall is entirely right in pointing out that the "efficiency ratio" is a misleading criterion where the design produces over-much deep or otherwise poor space. Nevertheless, many office buildings have been erected, and many more designed, as "maximum developments" under the zoning ordinances of New York, Chicago, St. Louis (and the other cities whose restrictions the volume summarizes), by architects who appreciate the practical importance of proper space and whose plans eliminated poor space to the fullest degree practicable through a careful consideration of the actual problems of each lot.

Surely, to have prepared for a few of these same lots alternative plans representing "maximum developments" under Mr. Ford's proposed ordinance—my suggestion—and to have compared the resulting capital costs, space, and income produced, with actual sound plans would not have compelled the consideration of a "myriad possible combinations beyond ready estimate." But such a practical test would have been a valuable indication of whether Mr. Ford's alternative regulations would drastically affect the amount of development applicable to a given lot (as hinted in one passage) or would benefit and save the property owner from himself (as hinted in another). Without some such comparison we are left up in the air as to the conclusion of the whole matter.

GRAHAM ALDIS

Book Reviews

Fisher, Ernest M. and Smith, Raymond F. LAND SUBDIVIDING AND THE RATE OF UTILIZATION. *Ann Arbor: University of Michigan, 1932. Michigan Business Studies, Vol. IV, No. 5. pp. 80. $1.*

Ever since the appearance of Professor Fisher's *Real Estate Subdividing Activity and Population Growth in Nine Urban Areas* some three years ago the need has been apparent for a more realistic and exhaustive study of subdividing activity. The relation of population alone to lots recorded annually failed to supply a satisfactory description, let alone an explanation, of what we have observed as an apparently unguided expansion of urban areas. Hence this latest monograph by Professor Fisher and Mr. Smith will be greeted as a progressive step toward discovering what has been going on in one urban area at least. While Professor Fisher still confines his efforts primarily to description, the detailed picture which he has drawn is of immense value in itself, as well as for a basis of further studies in this and other areas.

The purpose of this study is "to determine the relationship between population growth, real estate subdividing, or the preparation of sites for urban use, and the rate at which those sites were brought into utilization." The locale chosen for this investigation is the metropolitan region of Grand Rapids, Michigan, which is a more or less self-contained urban area relatively free from the influence of major outside forces. It represents that class of American cities which have had a fairly rapid growth with some boom periods in both subdividing and building but does not show the extremely violent real estate activity characteristic of certain American cities. The period to be covered, that from 1909 to 1931, was determined largely by the availability of certain data, particularly those concerning building operations, although it is regretted that the picture does not include the events surrounding the urban real estate orgy of 1890 to 1893 which seems to have been quite general throughout the country.

The method consists in breaking down the Grand Rapids metropolitan region into smaller parts in order to coordinate more accurately the subdivision and building data. Activity in these separate areas is then analyzed in terms of the number of lots recorded annually, the number of lots brought into use each year, and the resultant number of vacant lots available at the end of each year. The major difficulties surrounding the attainment of these various series centered about the determination of "lots utilized." The chief guide to utilization was the issuance of building permits but the absence of such data for areas outside corporate limits and other allied difficulties necessitated certain approximations which need not be discussed here. Such problems must be solved as local conditions and available data dictate and the necessary makeshifts may be overlooked, for the lack of adequate data for studies of this kind is generally recognized and the development of a working method, even though not thoroughly refined, is to be commended for the sake of pioneering in the field.

But of more general interest than the method are certain of the conclusions as to the history of urban development in Grand Rapids. Particularly interesting is the decrease in the percentage of vacant lots relative to total lots of record from 45.2% in 1909 to 43.9% in 1931; in other words, the number of lots utilized has increased slightly faster than the annual recordations. This fact raises questions at once as to what extent this situation may obtain in other urban areas and to what extent it is attributable to local conditions in Grand Rapids, such as the multi-family factor, transportation, elements conducive to home ownership, etc. But this slightly greater speed of utilization has not been sufficient to keep Grand Rapids from joining the ranks of the "oversubdivided" cities, for "if utilization of lots should continue at the average rate prevailing between 1909 and 1931 . . . it would require 34.9 years to absorb into use all of the lots which are now vacant."

The Grand Rapids data show also that periods of subdividing activity have coincided quite closely with periods of building activity. Again we ask, is this a usual co-

incidence? A closely related phenomenon is the tendency in Grand Rapids for the fringe of development to be far flung at one period, with development in the succeeding period or two tending to fill in the gaps left in the course of the previous rapid spread. Probably eventually this slack must be taken up, to a considerable extent at least, but is the process usually quite so regular as Professor Fisher's amoeba-like diagrams, depicting successive bulges in subdividing and building, show it to have been in Grand Rapids?

Space does not permit further comment upon the details of the Grand Rapids picture. Interesting though they are in themselves their real significance will appear only when similar studies give comparable data for other cities with which to test the general applicability of the conclusions drawn here and to develop generalizations of wider significance.

Mention should be made of the final section of the monograph which attempts to estimate the cost of excessive subdivision. While materials were not available for an exhaustive study, approximations show that the investment in unutilized land in Grand Rapids, even without inclusion of the tax burden involved, is an amount more than sufficient to pay off the city's entire gross debt. The fact of such enormous waste, which is doubtless duplicated in many cities throughout the country, should stimulate further studies leading to constructive suggestions for the control of subdividing activity.

HELEN C. MONCHOW.

Clay, Cassius M. REGULATION OF PUBLIC UTILITIES. *New York: Henry Holt and Company, 1932. pp. xi, 309. $3.50.*

At a time when public utilities and the gaps in regulating them are prominent in the political arena, Mr. Clay's book should be welcomed by many conscientious citizens who feel bewildered by the technicalities of the subject. Mr. Clay is a New York lawyer. He has become interested through a wide reading of material concerning public utilities; and he has sought to give a non-technical survey of what appear to him as the chief current problems of public utility regulation. As he himself describes his essay: "The theme of the present volume is the interaction of the relentless economic forces responsible for the growth of modern utility services with the forms and processes of democratic government provided for in the Federal Constitution." His own description betrays his legal interest.

As a survey, the author willingly concedes his book is not profound, erudite, or technical. Mr. Clay makes no pretensions on that score. His is a legally trained mind become aware of the economic nature of many legal problems, particularly those involving utilities. He is humble and not dogmatic in the face of recognized complexities. Nevertheless, the book exhibits a clear grasp of certain essential areas of controversy; and in addition to being humble, the author inclines to the liberal side of many controversial issues.

In the first section of the book, rate regulation is the major theme, especially the valuation problem. The standard Supreme Court cases are reviewed, and the weight increasingly given to present cost of reproducing the plant is duly noted. Mr. Clay, however, makes his obeisance to the economists, and expresses a preference for the views of the Court's minority, led by Mr. Justice Brandeis, in favor of "prudent investment." Relatively little attention is given to the other half of the valuation problem—the rate of return.

The second major division of the book embraces material best described in the short phrase, "Federal versus State Regulation." Like so many lawyers interested professionally or avocationally in constitutional history, the problem of distributing regulatory authority between the Federal Government and the states is of crucial interest. Mr. Clay's interest is focused by the tendencies within the utility industries to escape beyond the boundaries of state authority, exemplified especially by the growth of interstate transmission of electricity and the rapid development of holding companies. Mr. Clay reviews the salient proposals put forward during the past few years. He concedes the need for expanding regulatory authority. For interstate transmission he inclines to the joint federal-state board idea; but for holding companies, he seems to prefer a greater degree of state control.

The last section of the book is, in a sense, a plea for a "living Constitution." Mr. Clay takes his stand as a follower of Mr. Justice Holmes, believing that the Constitution

must be interpreted flexibly to meet changing conditions.

As a whole, the book has an easy style, though it is marred by too many quotations. Nonetheless, as an addition to the literature of popular education on these questions, it has distinct merits.

E. W. MOREHOUSE

HOME FINANCE AND TAXATION. *Washington: President's Conference on Home Building and Home Ownership, 1932. pp. xiv, 278. $1.15.*

The fundamental purpose of these investigations and reports was the analysis of the problems that must be solved in order to provide adequate housing and, preferably, home ownership for anyone of sound character and industrious habits. Inability of home owners to meet home financing charges because of heavy tax burdens becomes the cause of many foreclosures, and shows the intimate relationship of the problems confronting the two committees.

The Committee on Home Finance, approaching the problem of financing from the standpoint of lending agencies, favored adequate safeguards for these agencies as a means of lowering the purchase price for the home buyer. Thus, the Committee recommends that 25% of the purchase price be provided by the buyer from his savings in order that lenders may assume less risk and may lower borrowing rates. The Committee also recommends long-term financing in order to avoid renewal charges and commissions. The legal difficulties of foreclosure raise financing costs for home buyers, and therefore foreclosure laws should be so modified as to provide easier foreclosures, while redemption privileges should be extended. The report also points to the need for neutral and reliable appraisals, but the solution for this difficulty remains undisclosed.

The most valuable part of the entire report is the appendices which show some effort has been made to accumulate data and reliable information relating to methods and needs of home financing, but the answers to the questionnaires of the research assistants show that the Committee met with little cooperation, except from 21% of the life insurance companies, 23% of the building and loan associations, and 884 members of the savings bank division of the American Bankers Association, and was consequently forced to generalize upon insufficient data.

The chief shortcomings of the report consist in the narrow point of view from which the study was made. Assuredly there was justification for assuming the point of view of the lending agencies but there was no justification for omitting the point of view of the borrowing home owner. His interest in preserving mobility; in facilitating purchase by marginal home buyers; in the problems forced upon him through no fault of his own by a falling price level, or a rising price level; in the need for adequate publicity for scientific and accurate appraisals of land and building values has received consideration very indirectly, if at all, from the Committee on Finance. In fact, regarding the extension of easy credit for home construction, the Committee is inclined to believe that it is undesirable because it impairs the market for property which has been foreclosed by lenders. On the whole, therefore, the report of this Committee is distinctly inadequate, and points to the tremendous need for further study and accumulation of reliable data of vital interest to prospective and present home owners and lenders.

In marked contrast, the report of the Committee on Taxation shows a depth and breadth of view in analyzing the problems of home ownership. After a valuable analysis of the incidence of real estate taxes, the Committee finds that the concentration of heavy property taxes on real estate "discourages and materially restricts home ownership." Moreover, the Committee finds that home owners are not in a class by themselves, deserving of special treatment or exemptions, but that the home owners should seek redress of their grievances through measures designed to relieve real estate in general of the undue burdens of taxation. The Committee concludes that exemptions to home owners, or to improvements, are undesirable and that more lasting benefits will be derived through the reduction in the number of existing exemptions and concessions. Substantial relief is to be found in the improved assessment and administration of tangible property taxes (perhaps with some exemption for household effects); in the use of income taxes which are accompanied by adequate legal checks upon public expenditures; and in classified property taxes

wherever special limited income taxes upon intangibles cannot be legally used. If income taxes are to afford substantial relief, it is manifest that the exemptions in the several states must be lowered, the rates and administration adjusted to the federal income tax, and the property off-set provisions abandoned. Other revenues are considered with the recommendation that they be made to fit into the tax program as a whole.

Concerning the reduction in public expenditures as a relief measure, the Committee finds that certain expenses, such as interest on public debt, actually increase, and that reduction must proceed along routes which do not impair public efficiency. Like the report of the Committee on Finance the appendices to this report contain much valuable information for those interested in home taxation. On the whole, the report of this Committee shows maturity of thought and sane and tolerant consideration of problems, in view of the pertinent evidence available. Both reports leave the reader with a realization of the crying need for the accumulation of reliable, statistical information and further research.

ERNEST H. HAHNE

Pegrum, D. F. RATE THEORIES AND THE CALIFORNIA RAILROAD COMMISSION. University of California Publications in Economics, Vol. 10. *Berkeley: University of California Press, 1932. pp. vii, 165. $2.50.*

The present work deals with theories of both the general level of rates and particular rates as revealed in opinions of the California Railroad Commission during a period of almost 20 years. The closing date of the study is not given. Evidently the author's examination of cases has not included those as late as *In re Los Angeles Gas and Electric Corporation* (35 C. R. C. 443 (1930); U. S. D. C. (Cal.), April 8, 1932), which brings up important developments in rate regulation.

A sketch of the history of regulation in California opens the way for a review of the Commission's views on fair value. It has consistently adhered to the prudent investment theory as the only sound basis upon which a fair return should be earned. Fair return, considered by the Commission as of the time of inquiry, has ranged from 6.5% to 8% depending on the nature of the business. The author believes that, as theories are now applied by the California Commission and Interstate Commerce Commission, utilities cannot earn an average fair return over a period of years, since earnings in time of depression fall below the legal maximum which is a fair return.

The major portion of the monograph discusses the important problem of the proper standards of determining individual rates. Cost of service, what the traffic will bear, competitive rates, potential competition, and comparative rates, in turn are traced through the Commission opinions. Each basis has several aspects or meanings, and is variously applied by the Commission according to the circumstances of the case at hand. More often than not, the theory used is modified by other rate-making principles.

In his concluding chapter, Mr. Pegrum points out that no rule of thumb can be used to arrive at a particular rate, nor will any single theory suffice. Rate differentials reflect social considerations and the relative ability of the several classes of business to bear the charges. But, in general, so far as it is feasible, regulatory bodies lean toward cost as a determinant of particular rates. The starting point in the making of rates, therefore, is the financial need of the utility, which is met only by control of the general rate level. Consequently, "although other knotty problems are looming up rapidly, this is, at the moment, *the* problem in utility control."

Pointing out several pertinent current problems which still await solution, Mr. Pegrum concludes that despite its precedent-bound procedure, the California Railroad Commission has made substantial contributions to the development of a sound policy of regulation. But "what is needed now is a dynamic policy which frankly recognizes the inadequacy of early theories and practices for the solution of present issues."

Mr. Pegrum has written a good book, one well worth the attention of students of utility control.

HUBERT F. HAVLIK

Bartholomew, Harland. URBAN LAND USES. *Cambridge: Harvard University Press, 1932. pp. xvi, 174. $3.50.*

This analysis of urban land uses is based upon the author's conviction that the use districts prescribed by zoning ordinances have been prescribed in many instances with-

out sufficient knowledge of the facts involved or of adequate standards of reference. Mr. Bartholomew, therefore, has undertaken to discover the facts about land uses in several urban centers and to construct therefrom guides for future zoning programs or for the revision of existing zone plans.

His method is to describe the present situation in these selected cities with respect to the amount of land which is devoted to various uses, as well as the amount of land which is vacant. For comparative purposes and for purposes of generalization, these amounts are expressed as ratios: the ratio of single-family area, for example, to total urban area; the ratio of single-family area to the "developed area"; the amount of single-family area per 100 of the population, etc. From this array of ratios for the several cities Mr. Bartholomew has then derived an average figure for each type of use, which he proposes as a norm or guide to the approximate proportion of its area which a given city should devote to each particular use.

Space does not permit, nor is this the place for, discussion in detail of the specific findings as to the various amounts of land in the different use categories in the several cities, although many interesting comments are suggested by an examination of the figures. More pertinent is a brief consideration of the data which Mr. Bartholomew has employed and of their applicability for the purpose he suggests.

The data on land-use experience are drawn from a total of 22 cities: 16 self-contained cities and 6 satellite cities. These range in size from about 9,000 to 300,000 in the first group and from about 1,500 to 23,000 in the second. Mr. Bartholomew seeks to establish the representative character of his sample by showing what proportion of the urban population of the country lives in cities belonging to the same size groups as those used in his study and by pointing out the geographic distribution of the selected areas. But size is not the only criterion of representativeness and the reviewer wishes that more attention had been given to the character of the cities included and the effect of that character upon their physical layouts. Nor can the reviewer escape the fact that the findings of the study are, after all, based upon the experience of only 22 out of the 1,833 cities in the United States having more than 5,000 population.

As a corollary of this proposition it follows that too great reliance should not be placed upon the generalizations following from the averages here derived. Especially is this warning valid in view of the occasional wide divergence among the items from which the average is calculated. However, it may be that future similar studies will substantiate in large measure the averages which Mr. Bartholomew has found, but in the meantime they should be used with caution and with full realization of the limited data on which they are based.

These limitations are recognized from time to time by the author and these points are not advanced in criticism of Mr. Bartholomew or of his method. He has classified and analyzed admirably the material in his possession and deserves credit for making available this accumulated experience. If other city planners who have similar data at their command would follow his example, the profession itself and the city legislators who formulate zoning regulations would have a body of data which would constitute a better foundation for zoning practice.

HELEN C. MONCHOW

Smith, Nelson L. THE FAIR RATE OF RETURN IN PUBLIC UTILITY REGULATION. *Boston: Houghton Mifflin Company, 1932. pp. xiii, 334. $3.*

After the volumes written about the rate-base in public utility valuation, it is refreshing to find a book focusing on the rate of return. This has virtually and until quite recently been the "forgotten man" in valuation. Nevertheless, Professor Smith does not ignore the partnership of the rate of return with the rate-base in determining a reasonable level of rates.

This partnership indeed is a major theme of the first chapter which gives the economic and legal setting of the subject. In succeeding chapters the author breaks the "fair return" concept into its economic elements; ties together the return on capital and the level of rates for service to consumers; seeks a mathematical measure of rates of return allowed and of rates that would be fair; analyzes the factors affecting fair rates of return, as disclosed by commissions and courts; and concludes that in recent years the utilities have enjoyed a higher return than was justified.

Professor Smith's basic assumption is an economic system ruled semi-automatically by competition. In most of our system, he recites, competitively determined prices and rates of return on capital apportion our productive resources and activities in more or less orderly fashion to meet the needs and demands of consumers. Public utilities are exceptions. In these industries competition does not work at all or works wastefully. Hence they are regulated. The task, therefore, of a regulatory commission is to "pinch-hit" for competition, to reach the same prices and rates of return that would be set by competition if that force were allowed to enter and were to operate without too much waste.

Hence, to Professor Smith a cost of reproduction rate-base is economically defensible, logical, and desirable because it gives effect to current competitive prices, costs, and the proper "apportionment of productive power" so as to prevent "over-investment when values fall and under-investment when values rise." Similarly the rate of return in a regulated industry should reflect current "opportunity costs," if investments are to be apportioned properly throughout the system in accordance with the "competitive pattern." This simply means that a utility should be permitted to earn on a reproduction-cost base only the returns yielded from competing investment opportunities at the time of the inquiry.

Briefly stated, this is the theoretical foundation of Professor Smith's "calculated norm-rate of return." To the average year-by-year public utility bond yield, 1915-1928, he adds .5%, representing one-half the average difference between bond and stock yields, which is based on a 50% stock capital structure. Admitting that this index is only a "rough approximation," it nevertheless forms the basis for a comparison with the rates of return allowed by commissions.

To obtain an index of allowed rates of return, Professor Smith examined over 1,200 commission and court decisions from 1915 through 1928. Of these over a 1,000 stated specific percentages. These he grouped into frequency tables by utilities, by years, and by percentages, ranging from 4% to above 10.5%, at .5% intervals. An arithmetic average of the rates of return allowed in each year gives his index for the period, 1915-1928, inclusive. He then combines the indexes for each utility into an over-all index of the "average fair rate of return" and compares this with his "calculated norm-rate of return." The curves of these indexes, drawn on semi-logarithmic scale, show that the average rate of return allowed public utilities was above the "calculated norm" in every year except 1920, and substantially above during 1915-1917 and 1923-1928, inclusive. From such figures Professor Smith concludes that regulatory agencies have not, particularly in recent years, fixed rates of return according to economic principles, and that the rates allowed have been higher than was economically necessary, wise, or fair.

Professor Smith has read copiously among commission and court opinions, and articles and books by economists and lawyers. He has analyzed and arranged the ideas found therein, and done this ingeniously and often suggestively. Unfortunately, however, if he intended to change the minds and practices of wayward judges and commissioners, he puts his material into the molds of theoretical economics. He loses in persuasiveness by doing this as well as by so emphasizing his theory—regulation, the substitute for competition—that highly relevant material in corporate finance and commission practice is neglected.

For example, no consideration is given to capital turnover and the operating ratio in relation to the necessary rate of return. The possible effects of holding company capital structures upon the operating subsidiaries and the reasonableness of the latter's rates of return are ignored. In applying the opportunity cost concept, embodied in average bond yields, the implicit assumption seems to be that bonds are homogeneous, standardized commodities. Is this true? Do we not have to consider the "opportunity costs" of different grades of bonds, classified according to investment ratings if no better gauge is handy? Otherwise, if an average bond yield is used as a benchmark, the rate of return allowed a high-grade company might be more than "fair" and that for a new or poor company might be less than fair or necessary.

In truth, the reviewer believes Professor Smith gives too much weight to "opportunity cost" bond yields as a measure of "fair" rates of return. Logically, this concept fits his basic assumption of aping the results of competition; similar logic is behind his adherence to the cost of reproduction standard. In an established policy, admi t

ting of variations to suit special cases, it seems more sensible and defensible to base the reasonable rate of return for a given company upon that company's actual historical cost of raising various kinds of capital, checked for reasonableness by the experienced costs of other comparable companies and by a current "opportunity cost" bond yield. This deflates Professor Smith's apparent main reliance to the status of but one check of the reasonableness of actual costs. After all, what is a fair and reasonable rate of return cannot be answered by a single formula, for it is a very individualized problem, often peculiar to a particular company. This can be illustrated by some questions raised by some of the author's statements on pages 193-194. Are low rates of return earned a symptom of (1) over-investment, (2) economical capital-raising, (3) severe competition and high risk, (4) poor management, (5) depression? Indeed, it is exceedingly difficult to treat satisfactorily the rate of return as a general proposition. In my judgment, we need more analyses of individual company experience, studying the rate of return in its relation to particular corporate financial policies.

Statistically, Professor Smith's figures can hardly be said to present more than a prima facie case. His index of public utility bond yields, although it covers high-grade issues primarily, averages a considerable range of borrowing costs. It appears to be a yield on market prices rather than yield at offering prices, and overlooks the contractual nature of bond interest. The factor of bankers' margins is relegated to a footnote. Adding only ½ of 1% to market bond yields as extra compensation to stockholders for risk seems inadequate even to those who contend that risks in public utilities are at a minimum.

Finally, the reviewer has some misgivings about Professor Smith's two premises. Space is lacking for deservedly careful analysis of the proposition that regulation should ape competition. This is a time when our ideas of the role of competition are undergoing a rather drastic revision. His other proposition, that over- and under-investment in a given public utility industry can and must be controlled primarily through the allowed rates of return, seems to me bending theory to the wish. While allowed rates of return affect the ebb and flow of capital funds, they do not control in a precise way. To accomplish the purpose he has in mind, it seems more essential for a commission to have control over capital additions. Professor Smith would simply reduce the rate of return to retard the inflow of new capital into a saturated industry; but this might more directly tend to impair the capital already invested and hamper the maintenance of adequate service.

E. W. Morehouse

Book Notices

Federal and State Tax Systems. *Chicago: Commerce Clearing House, Inc., 1932. 3rd ed. pp. v, 145. $10.*

It is not an easy task, within the compass of a brief review, to do justice to *Federal and State Tax Systems*. The volume divides itself into three main sections. The first 60 pages give a factual presentation of the taxing systems for the National Government, the 48 states, Alaska, District of Columbia, and Hawaii. The next 40 pages give in similar fashion the tax systems in vogue in 23 foreign jurisdictions. With the exception of Africa, every continent is represented by at least one jurisdiction. The remaining pages are devoted to what are called status tables, containing a wide variety of tax matters.

The chart form in which the information is presented gives the reader a quick and comprehensive picture of a jurisdiction's tax system. In general, more space is devoted to the tax systems of southern states than to those north of the Mason and Dixon line. Less than a half page is needed to present the tax system for Indiana, while in the case of Alabama nearly as much space is needed as for the National Government itself. However, Minnesota is shown to have gone quite as far in the direction of diversification as have any of the southern states. The universality of the tax on general

property, the status of the taxation of incomes and intangibles, the taxation of chain stores, taxes on consumption and specific commodities, and the attempts made by various states to diversify their taxing systems and thus derive more revenue from other sources than tangible property are but a few of the many items on which the student of taxation can obtain factual material in this volume.

A superficial or casual inspection of the volume will fail to reveal its comprehensiveness. Wisconsin may be used here for illustrative purposes. On page 59 is presented the tax system of the State, but in the tax status section on 23 other pages additional information is given for 30 different tax items, such as taxation of real estate and of tangible personal property, taxation of banks, motor vehicle fees, income tax rates, etc. Other states are similarly treated so that comparisons may be made not only between states but with foreign jurisdictions.

The last few pages are devoted to tax collection data. It is regretted that more complete information could not be presented for tax yields. For some states only tax collections for state government are shown. In no case is the split shown between the state and local governments. However, when complete collection data are shown for a state, the disposition of these funds may be estimated by reference to that state's tax chart. Tax administrators generally are interested in knowing what proportion of the tax load is borne by tangible property as compared with other tax bases, and also what tax revenues go to the support of the state governments in contrast to local governments. On all these tax matters this volume acts as a ready reference work. *Federal and State Tax Systems* should be a force making for greater uniformity and harmony among the different states and the National Government in working out their various systems of taxation.

L. B. KRUEGER

Sakolski, A. M. THE GREAT AMERICAN LAND BUBBLE. *New York: Harper and Brothers, 1932. pp. 385. $3.50.*

This book is disappointing. The author uses the terms "land-grabbing," "land-jobbing," "town-booming," etc., with frequent relish unconfined by definition. He describes a multiplicity of speculations which would have been more interesting if less of a catalogue and more of an analysis of the causes—if only of the failures (for Professor Sakolski touches but very briefly on *successful* land speculation).

The later chapters, like "Jay Cooke's 'Banana Belt,'" describing one operation alone, are more interesting, although nowhere has the narrative much elan. The author shows wide acquaintance with secondary sources.

GRAHAM ALDIS

PLANNING FOR RESIDENTIAL DISTRICTS. *Washington: President's Conference on Home Building and Home Ownership, 1932. pp. xvii, 227. $1.15.*

Planning for Residential Districts was the first report to be issued from the President's Conference on Home Building and Home Ownership. It contains the reports of four separate committees of that Conference: the Committees on City Planning and Zoning; Subdivision Layout; Utilities for Houses; and Landscape Planning and Planting. In addition to these reports the book contains two important appendices: a study of the Relation of Size of Lots to the Cost of Utilities and Street Improvements in Low Priced Housing Developments and the report of a special group on Housing in Unincorporated Areas Adjacent to Cities. In this, as in other volumes in the Conference series, these additional items contain some of the best material in the volume. Particularly important is the inclusion of the discussion of the planning problems in unincorporated areas which too frequently fall outside the jurisdiction of planning authorities and thus constitute weak links in the extension of planned land utilization.

As is evident from the titles listed the book "deals primarily with the home surroundings," but reference to subsequent publications of the Conference seeks to relate the problems of this field to the other aspects of home building and home ownership. The variety of subject matter covered in the volume precludes detailed comment. All that can be assayed in this limited space is a brief evaluation of its contribution.

Probably one of the major contributions of this report, as well as of the Conference itself, is the focussing of attention upon the coordination of the various phases of a home

building and home owning program. Subdivision control or zoning without foundation in an official city plan, zoning without adequate reference to land value and taxation data cannot produce satisfactory results. This interrelatedness of the several aspects of the planning of residential districts is further strengthened by the emphasis which is placed upon the development of neighborhood units, especially in the reports on city planning and zoning and subdivision layout.

The reports stress also the necessity for adequate legal sanctions for planning and building programs.

Finally, the emphasis of these reports, as well as the others in the series which have appeared to date, upon the need and desirability for further research as the basis for any comprehensive program is indeed a point well taken. Nor are the Committees content merely to indicate the need. They list as a part of their reports specific research projects designed to yield factual material essential for future action. Such lists are not exhaustive, but they are suggestive and the hope may be expressed that they will call forth further investigations of a practical value along these and related lines.

HELEN C. MONCHOW

Edie, Lionel D. ECONOMICS: PRINCIPLES AND PROBLEMS. *New York: Thomas Y. Crowell Co., 1932. pp. xx, 859. $5.*

In a much more thorough and extensive revision than is usually attempted in a general economics work, the author of this volume has clarified the theoretical discussion as well as introduced more recent and up-to-date illustrations and statistical information.

To the readers of the *Journal*, Part VIII of the work will be of greatest interest. Here an attempt is made to paint with a broad brush a picture showing the infinite number of points at which public control of economic activities has been introduced. The author clearly recognizes the existence of a reciprocal relationship between the political and economic structures of society. He places upon the government the duties of cooperation, direction, and reconstruction, where economic conditions have failed to right themselves or have adjusted themselves so slowly as to bring about great hardship to many during the transition period.

No effort is made to go into the technical problems to which such control gives rise. This task is left to specialized books in the various fields. It is encouraging, however, to find recognition in a general economic treatise of the significance of the problems herein enumerated.

JOHN W. BOATWRIGHT

James Harlean, editor. AMERICAN CIVIC ANNUAL. *Washington: American Civic Association, Inc., 1932. pp. x, 276. $3.*

This fourth volume of the *American Civic Annual* continues the policy of summarizing conveniently the year's achievements in planned utilization of our natural resources. The 1932 edition, while somewhat smaller than the preceding issues, still chronicles very considerable accomplishments in this field "despite the depression." In fact, as one of the contributors to the volume points out, times like the present afford excellent opportunities "to consider and study fundamental problems which were ignored in the rush of individual planning movements." In other words, he pleads for the greater economies to be achieved by a continuance of scientific planning than by curtailment or actual elimination of planning expense at such times as these.

This edition follows the same general plan as the previous volumes, dividing the material into four divisions as it pertains primarily to the nation, the various regions, the states, or the cities and towns. Incidentally, this division appears rather arbitrary and stilted; a division along functional lines would seem to offer more constructive possibilities.

The separate articles are essentially descriptive of specific projects and programs rather than critical or analytical of the aims and purposes sought to be achieved. The land economist, of course, finds most interesting those items which are concerned with land values, home financing, conservation, etc., which emphasize the economic, as well as the physical, elements in planned land utilization. In this group belong Mr. John M. Gries' description of "The President's Home Building and Home Ownership Program"; Mr. Robert Whiten's, "Is Land-Overcrowding Necessary?"; Mr. Jacob L. Crane, Jr.'s outline of the Iowa Conservation Plan. And always of interest are the stock-takings and consideration of trends and tendencies of a profession as viewed by its own members. Such are the contributions of Mr. Shurtleff and Mr. Bartholomew in this volume.

HELEN C. MONCHOW

Books Received

Babcock, Frederick M. THE VALUATION OF REAL ESTATE. *New York: McGraw-Hill Book Co., Inc., 1932. pp. xi, 593. $5.*

Berle, Adolf A. and Means, Gardiner C. THE MODERN CORPORATION AND PRIVATE PROPERTY. *Chicago: Commerce Clearing House, Inc., 1932. pp. xiii, 396. $4.50.*

Bonbright, James C., and Means, Gardiner C. THE HOLDING COMPANY: ITS PUBLIC SIGNIFICANCE AND ITS REGULATION. *New York: McGraw-Hill Book Co., Inc., 1932. pp. xv, 398. $4.*

Duddy, Edward A., editor. ECONOMIC POLICY FOR AMERICAN AGRICULTURE. *Chicago: University of Chicago Press, 1932. pp. xi, 150. $2.50.*

Duncan, Julian Smith. PUBLIC AND PRIVATE OPERATION OF RAILWAYS IN BRAZIL. *New York: Columbia University Press, 1932. pp. 243. $3.75.*

Foreman, Clarence J. RENT LIENS AND PUBLIC WELFARE. *New York: Macmillan Co., 1932. pp. vi, 207. $2.*

FOREST LAND USE IN WISCONSIN. Report of the Committee on Land Use and Forestry. *Madison: Executive Office, 1932. pp. vii, 156. $1.*

Hough, Eleanor M. THE CO-OPERATIVE MOVEMENT IN INDIA. *London: P. S. King & Son, 1932. pp. xxvii, 340. 15 shillings net.*

HOUSING AND THE COMMUNITY; HOME REPAIR AND REMODELING. *Washington: President's Conference on Home Building and Home Ownership, 1932. pp. xv, 291. $1.15.*

HOUSING OBJECTIVES AND PROGRAMS. *Washington: President's Conference on Home Building and Home Ownership, 1932. pp. xxv, 345. $1.15.*

Kingsbury, Susan M. and Fairchild, Mildred. EMPLOYMENT AND UNEMPLOYMENT IN PRE-WAR AND SOVIET RUSSIA. *Hague, Holland: International Industrial Relations Institute, 1931. pp. 132.*

Taylor, Alonzo E. CORN AND HOG SURPLUS OF THE CORN BELT. *Palo Alto: Stanford University Press, 1932.* (*Food Research Institute.*) *pp. xxi, 658. $4.50.*

WORLD SOCIAL ECONOMIC PLANNING, with Addendum. *Hague, Holland: Internation Industrial Relations Institute, 1932. pp. lxiii, 935. $2.50.*